

SUPPLEMENT.

The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

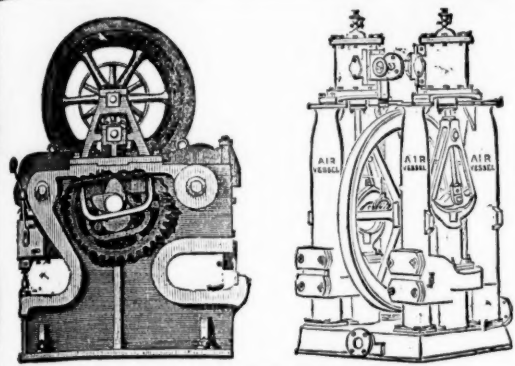
FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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No. 2037.—Vol. XLIV.

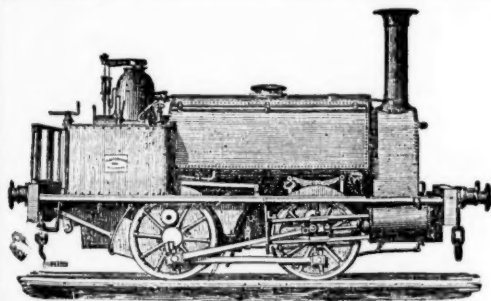
LONDON, SATURDAY, SEPTEMBER 5, 1874.

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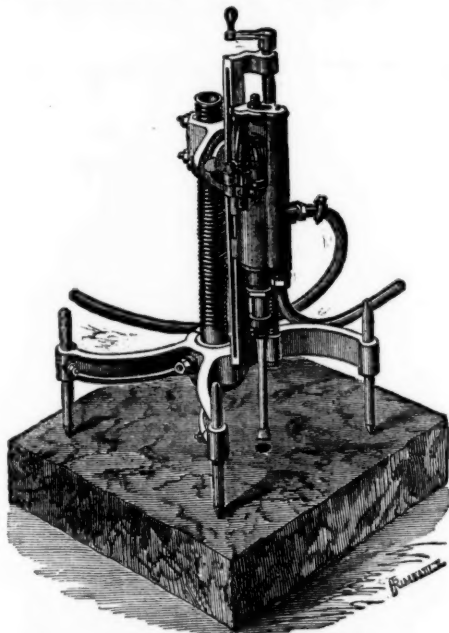
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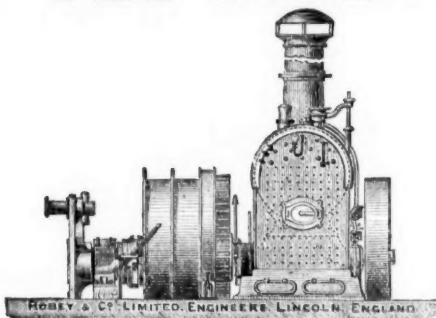
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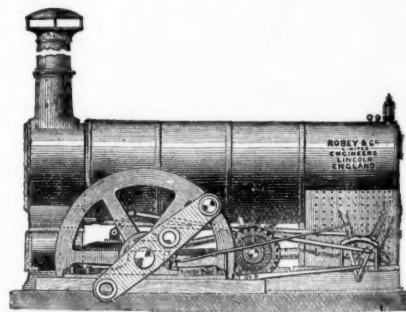
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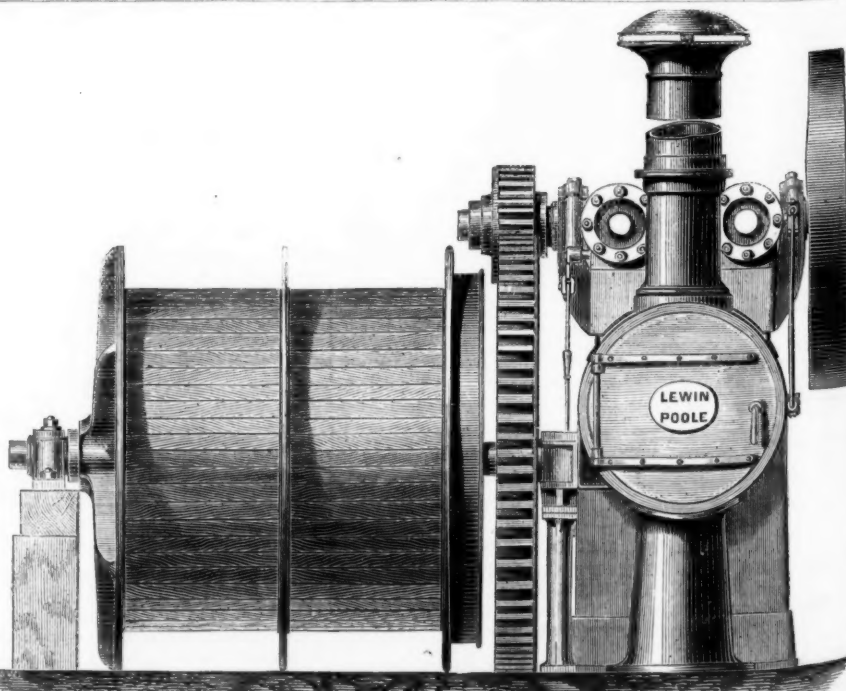
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week. During this time it is precisely the same on nearly all of them—that is, sluicing with water is procurable, and around the Sugarloaf that is plentiful enough. One remarkable feature worthy of note is the discovery of leads or runs of wash, rich with ore in the ridge far away from the creek beds, and quite distinct from them. This is, indeed, most important, for it doubles the wealth or value of many of the holdings. I saw one remarkable instance of this second lead, about 70 yards from the run in the creek, on the block owned by Mr. D. S. Dickson, which bears the name of Bolwara, called after the well-known Dickson estate near Maitland. The new run is over 60 ft. wide, and averages a wash in depth of about 2 ft. From the claim about 5 tons each week is sold, and the tributaries, Chinamen, raise it at a price which leaves a handsome profit, even at the present low rates. The only expense Mr. Dickson is put to is that of supervision, a very necessary one with tributaries at work. This is done by one man, who sees that the ground is properly and fairly worked, and the ore dried and cleaned fit for market. The celebrated Lode Creek Mine, a short distance from the one I have just referred to, is at present in the hands of tributaries at the rate of 33¢ per ton. From this land during the last two

years tin has been raised, over 300 tons in all, and no signs of exhausting the treasure. In fact, from what I saw on Mr. Dickson's land, I am inclined to think that many of the selections will be good for more than 10 years if the present style of working is pursued. After that time the deep runs, many of which may be discovered ere then, will supply the deficiency caused by the giving out of the shallow.

This reporter has not visited the tin mines that send their tin *via* Murrumbidgee, there the mines are of large extent, and the ore more sparsely distributed.

Since the price of tin has fallen a very large extent of tin land has been thrown out of working; many companies have closed, as they were losing money by their operations; others discharged half their men; some let their mine on tribute; but the fact remains that the mines produce over 150 tons of ore per week, and large areas of tin land will be brought into working when tin rises in value, or, perhaps, when sufficient skill is acquired to work to advantage.—*Sydney, July 3.* — NEW SOUTH WALES.

MINING IN NEW SOUTH WALES—THE FULLER'S REEF COMPANY.

SIR,—It is now fully three years since I sent you any reports of foreign mines. I am now in New South Wales, and have lately been inspecting the quartz reefs of the celebrated Hawkin's Hill, of whose richness in gold you have no doubt often heard. This chain of hills lies in the district known as the Tambourra country. The claims of individuals are all small, varying from 120 to 150 ft. along the vein, or mother reef. Their yield is wonderful, but they do not, I consider, get more than half the gold, owing to their imperfect machinery.

There is a new English company started to work a reef, called the Fuller's Reef, in this neighbourhood. I came here purposely to see this mine, as I had been told they had sent out some machinery with newly-patented amalgamators. On visiting the mine I found this machinery had not been brought up from Sydney. I inspected the long tunnel they have cut to drain the mine, and nothing appears to be wanting but this machinery of stampers and the new amalgamators. With their present stampers and water-power they ought to accomplish 150 tons a week, when once things are in order; but with all I hear of this new machinery they ought to do double that. The quartz veins are full of gold, and should yield at least from 10 ozs. to 50 ozs. to the ton. I think this Fuller's Reef, judging from what smaller claims were yielding, richer than the reefs at Hawkin's Hill, and so I am sure it will prove. If the capitalists of Europe only knew what could be done here by capital, and by men of some chemical knowledge and engineering skill, they would not employ the kind of men whom they call here mining captains. The mania here for tin mines is expiring fast. The last sales in England have not paid the cost attending the export of the ore and the high price of labour.

I hope to send you a series of papers on the "Metallurgy of Australia."—*Scene, July 7.* — A MINING ENGINEER.

THE COLORADO TERRIBLE MINING COMPANY.

SIR,—From the Journal (which I receive regularly) I see that the market value of Colorado Terrible shares has been gradually decreasing. This, to one living in the immediate vicinity, and well acquainted with the mine, seems quite incomprehensible, as there is not the least doubt that the mine is increasing in value, I might say daily, and its future prospects never were brighter than at the present time. Beside all this, the mine has actually made large profits during the past 18 months, for at that time, it will be remembered, there was a heavy debt hanging over the property, on a part of which a high rate of interest was being paid. Now the mine is clear from debt, its debentures are paid off, a dividend has been declared, and there is a large balance in hand. Then, the mine still continues to produce its regular quota of ore, and the concentrating works are doing most successfully, producing large quantities of ore, both for shipping and sale to the local ore buyers. It is found that the quantity of second-class ore produced from the mine, together with that from the dressing floors, which is sold to local buyers every month, is much more than sufficient to meet the monthly cost both of mine and concentrating works. This leaves the shipments to England as clear profit to be divided among the shareholders, or otherwise disposed of as the directors consider best for the benefit of the company. These shipments will now be at least four every month through the concentrating season, which means about 2000L to 3000L, and when Mr. Teal gets the crushing department of his works going he will be able to make one or two shipments more per month, which means so much more profit.

Now, taking all these things into consideration, why is it that Terrible shares are worth on the market no more than they were 18 months ago? I can see no other reason than that "bearing" is going on in the market. Otherwise the market value of shares ought to be at least their par value, and I feel sure that before the year is out they will be worth that amount, if they are not at a good premium.

Silver Plume, Colorado, Aug. 12.

ERNEST LE NEVE FOSTER.

COAL MINING IN ITALY—THE SASSO FORTE COLLIERIES.

SIR,—The letter of Mr. W. J. Jacob to the directors of the Sasso Forte Collieries Company (Limited), published in the Supplement to the *Mining Journal* of Aug. 22, comes out most opportunely. Here we have the old story again, and another example of the inability of English directors in dealing with affairs in Italy, as the history of Anglo-Italian companies during the last 10 years bears evidence.

In the height of the coal fever in England, when fabulous fortunes were expected to be realised by opening out new collieries in all parts of the world, a company was brought out, under the title of "The Sasso Forte Collieries Company (Limited)," for working some deposits of coal in the valley of a small torrent called the Acqua Nera, near the village of Sasso Fortino, in the province of Grosseto. An eminent engineer was sent out to inspect and report upon this property, and, as is usually the case with such eminent gentlemen, who use magnifying glasses of extra power, he made a flying visit to the proposed mines, and from his knowledge of geology (being a F.G.S.), together with the help of his rose-coloured spectacles, speedily came to the conclusion of the existence of 9,000,000 tons, though upon data he based his calculation it is impossible for me to say. On the strength of his wonderful report a board of directors, composed of gentlemen none of whom had the slightest practical knowledge of coal mining (and, in fact, with the honourable exception of one member, their general business capacities have proved to be extremely limited), is appointed to look after the interests of the shareholders, and one of the vendors to take the general superintendence of the mines, assisted by a qualified English overseer, as promised in the prospectus. Upon the death of the manager his brother, Mr. Camillo Montelli, was appointed to succeed him, with the more ambitious title of "our general manager in Italy," though his qualifications for such a position appears to have been that he was an opera singer of fair abilities, and had had the management of a theatre in London at one time; and for this reason the directors probably thought him competent to take the management of a colliery in a foreign country; although we all know that for an undertaking of this character in England, and under their own noses, the directors invariably secure the services of some gentleman who has made coal mining his special branch of study.

After six months the English superintendent, who was supposed to have been appointed to look after the interests of the English shareholders (and no man ever did his duty more conscientiously), finding his reports and warnings unheeded by the directors, threw up his appointment, and returned to England in disgust; and from what he and others told the board, they must have known that "a screw was loose somewhere," and that their "general manager in Italy" had not only proved to be incompetent, but also to be a man of unlimited ambition, sacrificing the company's interests, as well as his own (for as vendor he was paid a large amount in shares), in personal aggrandisement. One of the first acts under his management was the creation of a brass band, and a first-rate bandmaster was procured from Florence to instruct the workmen, and the band which, considering the short time it has been established, has made considerable progress (if that be any consolation to the shareholders, who I should be inclined to think would wish for something more tangible, in the shape of dividends), and is called out upon every

imaginable occasion to trumpet forth the "general manager in Italy's" greatness.

If he had devoted all his energies to the band, and in making speeches to the delighted mob, and had left the practical management of the undertaking to Capt. Jacob, who was appointed engineer to the mines by the directors, no great harm would have come to the shareholders of the company; but our ex-theatrical manager, dazzled, no doubt, with the splendour of his new title, and still more so by the flattery of his dependents, determines to have "a finger in the pie," and holds council with the clerk, who knows rather less about mines and their management than himself (if that be possible), the stable boy, and some eight or ten corporals (foremen), who were selected by him from the peasantry of the neighbourhood to take charge of the working of the mines. It is decided by this council that the orders of the "Inglese" shall be disregarded; and no orders or instructions of the mining engineer were allowed to be carried out, and the board of directors in London wilfully shut their eyes, and bowed down to the decision of the "general manager in Italy." The results show the folly of their conduct in not giving their full support to a practical miner like Capt. Jacob, and the Acqua Nera mines at the present moment are a monument of English directorship and mismanagement in Italy. Several pits have been sunk and galleries driven in the coal for a short distance, without any regard to the economical laying out and future development of the collieries. The favoured system of mining adopted by our ex-theatrical manager, and chief adviser, the stable boy, appears to be in grubbing away the coal at the outcrop, and cleaning it of water stains and pyrites, by a gang of little boys with hammers. Long wall, pillar and stall, and such antiquated systems, being totally disregarded by "our general manager in Italy."

No attempt of any kind has been made towards proving the extension of the deposits of coal, either by driving bodily into the seams or by boring, and still less has been effected towards the laying out of the works to ensure the output of 300 tons daily, and which the prospectus would lead one to suppose might be increased to upwards of 600 tons per day. What has the eminent engineer who inspected the property, and afterwards was appointed consulting engineer, been doing all this time; and supposing that he was consulted by the directors, why did he not give them better advice? The echo answers—why!

Seeing "the errors of their ways," the directors seem to have been smote by their consciences that they were not doing their duty to their shareholders in ignoring facts which to anyone else were only too palpable; and in May last the Mr. Wild alluded to in Mr. Jacob's letter was sent out to see how "the wind was blowing in Italy," what the result of his mission, or rather "wild goose chase," were it is impossible to say, but it is very evident that he did not report any "breakers ahead," and the board relapsed again into that state of inanimation for which it is so distinguished.

It is high time in the interests of the undertaking that they should "awake from their slumbers," and that steps should be taken towards the opening out of the mines; and I am convinced that by the purchase of some of the adjoining property the Sasso Forte Collieries Company (Limited), under a proper management, might soon be made to pay, though not to the extent mentioned in the prospectus, which estimates that the working of these mines would give a profit of considerably over 50 per cent. on the total capital of the company. Such estimate, which has evidently merged from "the realms of fancy," could never have originated in the mind of a practical miner, and savours too much of theatrical clap-trap to inveigle any but the most unwary.

That the coal of the Acqua Nera collieries is of excellent quality, and superior to that of many of the neighbouring mines, is an undisputed fact, and considering as yet it has only been obtained at the outcrop, there is every reason to anticipate that it will improve at a certain depth below the surface.

I am of opinion that, notwithstanding the falling off in the price of coal in England, there are no grounds to fear any decline in the sale of native coal in Italy; and if proper care be taken in securing good properties in that country, and by their economical management afterwards, Italian coal mining will offer a most profitable field for Anglo-Italian enterprise.

AN ANGLO-ITALIAN.

Rocca Strada, Aug. 26.

THE DEEPEST COLLIERY IN THE WORLD.

SIR,—In the *Mining Journal* of August 29 it is stated that Rose-bridge Colliery is the deepest in Europe (816 yards). I think that the remark is wrong, as there is a pit at St. Gilly, Châtelineau, three miles from Charleroi, Belgium, 860 yards (940½ yards) deep, perpendicular from the surface, and it was intended, whether carried out or not I have not heard, to sink another shaft in a tunnel from the bottom of the first shaft, a further depth of 150 metres (164 yards).

MARCUS W. T. SCOTT.

Westminster Chambers, Victoria-street, Sept. 2.

RICKARD'S PATENT AMALGAMATOR AND CONCENTRATOR.

SIR,—Upon a previous occasion I called the attention of your readers to various experiments instituted in my laboratory for the purpose of determining the merits of Rickard's patent amalgamator and concentrator, and expressed regret that these instruments had not, up to the time of writing, received the opportunity of being tested upon a really practical scale. The results from the model machine afforded indications sufficiently good to induce the proprietors of a Canadian gold mine to engage Mr. Rickard to go out, and there place his machines into full operation. I am just favoured with a report of the results, which I hasten to make known through the medium of your valuable Journal, as much for the enlightenment of your subscribers in foreign gold-producing countries as for investors at home. In this I may candidly admit I am somewhat actuated by a spirit of selfishness, trusting to be spared the trouble and expense of replying separately to the various parties, especially in the United States, the Dominion, and Australia, who are constantly applying to me for further information upon the subject. Perhaps I cannot more effectually accomplish the object in view than by giving in *extenso* the report presented by Mr. Rickard himself to the directors of the Toronto Gold Mining Company, dated Aug. 6:—

"The following assays have been made on tailings and ores which have been submitted to the action of Rickard's amalgamator:—

Tailings from roasted ore, previously treated by the ordinary process.		
Before amalgamation—Gold	\$12.54 per ton	
Gold	11.25 per ton (Average \$12.11)	
Gold	12.54 per ton	
After amalgamation in Rickard's machine.		
Heavy tailings	Gold a trace Light tailings	None
Mispickel ore—crude, unpicked, and unroasted.		
Before amalgamation—Gold	\$3.26 per ton	
Gold	3.26 per ton	(Average \$3.01)
Gold	2.50 per ton	
After amalgamation—Gold	\$2.00 per ton	
Gold	3.13 per ton	(Average \$2.28)
Gold	2.50 per ton	
Gold	1.50 per ton	
Estimated yield	\$0.73 = 18 grains per ton	
Actual yield by assay of mercury	21 grains per ton	

From the foregoing list of assays, you will observe that during the last fortnight the class of ore which has been submitted to the action of my amalgamator has not been of a quality to demonstrate as clearly as could have been wished either the capabilities of the machines or the value of your mines. Several important and valuable features, however, have been manifested in the course of our operations, which serve to show the value of these machines for the purpose they were designed to perform.

1.—The whole of the gold was obtained from 5 tons of tailings (assaying about \$12 per ton), which had been the residue of a previous amalgamating operation, after having been treated by Prof. Chapman's roasting process, by which the sulphur and arsenic had been drawn off, and the gold set free, and in a condition to amalgamate with mercury.

2.—The concentrating machine or settler will recover mercury from tailings which have carried it off in previous operations (this was satisfactorily demonstrated by an increase of upwards of 10 lbs. over and above the quantity employed), on cleaning up the machines after working the aforesaid 5 tons of tailings, which had carried off a considerable quantity of mercury when first worked.

3.—They amalgamate all the gold contained in unroasted mispickel ores that is in a condition to combine with mercury, as is clearly shown in the results of the last 10 tons run through. An assay of the quicksilver employed showed a larger amount of gold obtained by actual working than had been estimated by the difference between assays of the ore before and after treatment. This slight difference in favour of actual working may be accounted for by the presence of free or float gold, which escapes detection in the assay. Although we have not succeeded in obtaining the same results as those of Prof. White, of London, it must be remem-

bered that he operated on exceptionally rich ore, containing a large amount of visible (free) gold, and which came from a different mine to that which has been submitted to the action of the larger machines. Possibly, however, when your new mine is opened to greater depth, ore approximating to the specimens forwarded to Prof. White may be reached, when I have no doubt similar results will be obtained by your large machine. The question of roasting, in order to obtain the gold left in the tailings, is not one of a very serious character, as it is only the concentration (1 in 10) that will have to be so treated, and the amount of arsenic acid or one of its products, in the shape of orpiment, will amply cover the cost of this operation.

4.—The amount of work estimated has also been satisfactorily accomplished by the amalgamator—1 ton per hour, a charge of 1800 lbs. having been worked through in an hour with the same facility as that of 1000 lbs., although the machine was not charged to its full capacity. When stronger plates shall have been substituted for the too weak ones with which we commenced, I feel assured as much as 1½ ton may safely be introduced at a charge, and this will become thoroughly amalgamated in an hour.

5.—In consequence of the peculiar character of your ore—i.e., its great specific gravity—greater settling capacity than had been estimated (on a basis of ordinary Australian or Californian quartz) will have to be provided, in order to avoid loss of mercury by running off the tailings too quickly. Two or three concentrators will be required to keep pace with one amalgamator and a 20-stamp battery, working at the rate of 1 ton per hour.

6.—Great care must be observed in regulating the speed at which the machines are run, and which may have to be varied with different classes of ore. For that I have been just operating upon I find 40 revolutions per minute for the amalgamator and 12 for the settler most effective.

7.—As the battery slimes from your ore show as rich as the pulp, I recommend you to run them through a settler specially appointed for the purpose before allowing them to escape. These slimes being chiefly charged with float gold, the whole or major part of it will thus be kept in good active condition by the application of clean mercury and cyanide of potassium at least once a day.

W. T. RICKARD, F.C.S.

As far, then, as the treatment of the tailings is concerned the operations of the machine are eminently successful, but it is matter of regret that the ore itself should not have been of the same high standard as the specimens submitted to me for assay. These yielded gold to the extent of 6½ ozs., and in one instance I obtained (gold being visible) 26 ozs., per ton. I am apprised that the bulk operated upon was from a different locality to the quantity brought to me for experimenting. I would call especial attention to clause 2 in Mr. Rickard's report, wherein he points to the recovery of an enormous amount of mercury (10 lbs. in 5 tons) from tailings which had been submitted to previous operations, and a totally different process. I need not dilate upon this highly important feature, especially at a time when quicksilver demands a price approaching the region of prohibition. Purely gold quartz, it has been repeatedly proved, requires no previous treatment beyond its reduction to an impalpable powder. Mispickel and sulphides need roasting, but this operation may be rendered innocuous, and even profitable, by the employment of a suitable furnace, by which both the arsenic and sulphur may be collected. In conclusion, allow me to express gratification at this approximate solution of the most feasible method of recovery of gold from what has hitherto been regarded as waste matter.

W. WHITE.

Laboratory and Assay Office, 25, Finsbury-place, Aug. 26.

SEPARATION OF ORES BY MAGNETIC POWER.

SIR,—In the report of my paper, read before the Miners' Association—"On the Separation of Ores by Magnetic Power" (published in the Supplement to last week's Journal), a mistake occurs which I shall be obliged by your permission to correct. It occurs in the passage referring to the mode of heating spathose iron to render it magnetic—"It is necessary, however, that this heating should be done without access of air, or a higher oxide which is more magnetic is produced." The words *more magnetic* should be *non-magnetic*. Perhaps you will also allow me to state, in reply to a paragraph in the favourable notice of my process in your last Journal, and to several enquiries, that the mixed tin and iron ores that I have tested since the meeting at Falmouth have presented no special difficulties either in rendering the iron ores magnetic or in their subsequent separation from the tin ores. FREDK. J. KING.

London, Sept. 1.

THE NASCENT COPPER PROCESS.

SIR,—I have read from time to time in the Journal very interesting allusions to and some attempts at exposition of this process. It cannot be denied that if the results claimed for it can be only approximately realised the beneficial effects on mining industry may only be something enormous. Some of the writers referred to have pointed out that the process, or something extremely like it, has been in use years ago, is now, and prior to the securing of Mr. Barnard's patent, in Wales and at Wheel Franco, by Mr. Longmaid, many years ago. I do not pretend to know how far these statements are correct, but, if true, a newly-acquired patent cannot, I should suppose, shut out the public from using what was known and practised long before it. It appears to me of importance, to avoid both unnecessary and undesirable litigation, that the patentees should point out in the Journal clearly what it is they have patented that is new. In Weald's useful series of Scientific Text Books, that on "The Metallurgy of Silver" seems to describe a process with common salt very like that now called "The Nascent Process." If that is so, I take it there cannot now be a patent taken out for it. My object is not to dispute the reality of the patent process in question, but to ascertain really what it is. If it really be a new and valuable discovery let its proprietors, in promoting the interests of our mineral industries, by all means get their share of the benefits. But I think you will agree with me that the interests of mining are too vast, and the value of their healthy development too great, to admit of doubt as to the novelty and utility of the invention, or discovery in question. Let us have a much more clear and lucid exposition of the process than is to be found in the specification of the patent published at the Patent Office. Let us know what in the patent really is that is novel or peculiar. Once satisfied on these points I shall rejoice if it can be shown that "hardly a mixed metal mine in the world but may be made to pay dividends under this system." No one would in such a case grudge to pay a fair royalty to be allowed to use it. I trust Mr. Barnard, or the respectable firm of Emmens Brothers and Company, will instruct your readers on the subject, and among them

A MINE ADVENTURER.

LIGHT RAILWAYS FOR MINES.

SIR,—I quite agree with the opinion that has been expressed during the past few weeks as to the advantage to be derived from the adoption of mechanical drills and dynamite, but I think the construction of light railways for accommodating groups of mines no less important; the cost of cartage and removal of ore stuff at surface and to the shipping place amounting to a sum which would astonish both mine captains and mine adventurers if it were brought together in each account in a single item. In tin mines, for example, ore which contains 56 lbs. of black tin to the ton is considered very good, yet in dressing this 40 tons of stuff would have to be moved several times before a ton of black tin is obtained; this involves a very large amount of labour, and now that labour is certainly not over plentiful it should be economised to the utmost. Blake's stone-crusher, with picking table, effects a wonderful saving in time, and the first cost is comparatively small, and light railways laid about the surface of the mines, as they are laid about ironworks and large manufactories, would be an additional source of economy.

The style of railway I should propose would be extremely simple—a mere wooden framework, with light angle-iron to serve the purpose of rails, and all difficulties, legal or other, about crossing public roads might be avoided by using what might be described as drawbridge gates. Thus if a 30-ft. road is to be crossed I would make two 20-ft. lengths of the railway framing, locking together where they meet, and hinged at the opposite ends to the fixed portions of the line. If the railways were made 3-ft. gauge and with 4 in. by 4 in. wood and angle-iron of 20 lbs. to the yard, a line of ample strength might be made at a very small price per mile; it could be worked with a small and cheap engine, and if it were only used for removing the ore stuff at surface, which is now removed by hand, would soon repay the outlay. This, however, would not be the most important point. If the adventurers connected with a group of mines could be induced to combine there would be no difficulty in greatly economising the cost of dressing, where the but the crushing and rough separation done at one place, where the best obtainable machinery might be erected on joint account and used upon certain defined principles, so that none would be inco-

Mr. D. A. N. DAVENPORT, an English ironmaster, thought it would be most desirable if some well-qualified geologist were to study the general laws of the disposition of minerals, so as to enable them to get at the ore they sought with more certainty than appeared to be possible at present. He considered that the late Government did the right thing when they appointed a Royal Commission to enquire into the coal-bearing strata of the country. He thought the members should not be deterred from pursuing to positive demonstration whether they were likely to be successful or not, and their thanks were due to those who took upon themselves the onerous office of Commissioners. Referring to the coal found at St. Bees, he said that was very encouraging evidence, but that it was not the only source of information. He had for many years studied the geology of Barrow, and as the result of his observations he predicted that if Barrow were not actually the seat of the coal measures coal would be found at no considerable distance.

The PRESIDENT fully appreciated Mr. Adamson's wishes, and would be glad if any gentleman would accept the invitation given, and expound the law for saving trouble in searching for coals.

THE IRON ORES OF SWEDEN.

BY CHARLES SMITH, BARROW-IN-FURNESS.

The iron ores of Sweden were described as being, with an insignificant exception, of one class; and though they vary considerably in their iron percentage, and to some extent in other constituents, they have a very great external similarity. The ore is either magnetite or red hematite, containing every percentage of metallic iron from 30 per cent. to almost chemical purity, which for the former would be 72, and for the latter 70 per cent. The hematite, called "bloodstone," gives the same streak as the English red hematite, but is externally scarcely distinguishable from the magnetite; both kinds are named in Swedish "Mountain Ores," they have a slightly different aspect to the Spanish and Algerian magnetites, but possess nearly the same blue-black colour. A small variety of quantity of brown hematite is procured in the South of Sweden, from the large bogs of Smaland, and in winter a similar ore is dredged from the bottom of certain lakes in the same province. The average of this ore would, probably, not exceed 25 per cent. metallic iron, though it occasionally contains 50 per cent.; frequently it is so intermixed with sand as to be of little value; phosphoric acid is generally present, sometimes up to 4 per cent.; manganese is often a constituent, and in a few places has a strength of 20 per cent. The yearly quantity raised of this ore is as varied as its composition; in 1855 it was 12,000 tons; in 1856, 20,000 tons; in 1857, 17,000 tons; in 1858, 15,000 tons; in 1859, 15,500 tons; in 1860, 12,000 tons. The ores of iron, with trifling exceptions, do not occur in Sweden. The red and brown hematites and the colitic ores, such as those we have in England, are absent altogether; chalybite, the white carbonate, is found in small specimens in a few of the metalliferous mines, and a thin insignificant bed of argillaceous iron ore has been met with in the Skane coal field. Judging from official returns, the average yield of the "Mountain" ores throughout the kingdom is under 50 per cent. metallic iron. In 1872 from 671 mines 718,000 tons of ore were raised, and 335,000 tons of iron were manufactured; but of the former 12,000 tons were bog and lake ores, with very low percentages, and about an equal quantity of the "Mountain" ores was exported to Finland. Besides the iron oxide, the main constituent of the ores is almost invariably silica. Lime, magnesia, and alumina are generally present; the last usually in the smallest quantity. Phosphorus has rarely a greater strength than 0.05; though in some ores, not worked, upwards of 1 per cent. is found, and it sinks to 0.004 at Persberg, and to 0.003 at Dannemora. Sulphur, with a few marked exceptions, is not generally present to a much greater extent than phosphorus.

The surface of Sweden is mainly covered by Plutonic rocks, of which granite is the most abundant, although large areas are also a felspathic rock peculiar to Sweden, termed "Helleflinta," or Leelite, which, though small in quantity, is of great importance in reference to iron, as this metal is nearly always present where Helleflinta occurs. Over a vast area, in these granitic rocks, iron ore is found in greater or less abundance; though, doubtless, the iron districts are still most imperfectly known, as so much of the country, especially in the North, is for iron-making purposes inaccessible. Far in the North, beyond the head of the Gulf of Bothnia, the iron deposits of Gellivara are, probably, the richest in the world, in the rigour of the long winter, but they have hitherto prevented any commercial success in the working of the mines, and according to the Government returns, the annual production does not reach 50 tons of ore. In the southern portion of the kingdom very little ore is raised. The main bulk is obtained from the central provinces. The counties of Kopparberg and Örebro alone produce 50 per cent., and Westmanland and Värmland 30 per cent. of the whole yield.

Iron ore is by far the most important Swedish mineral. The mountain ores occur in veins, which are sometimes regular, but more generally deflected from a straight line, and occasionally even form a series of small veins, running north-east to a south-west direction, though north to south and east to west veins occur. Their width varies from mere strings up to, as at Dannemora, 150 ft. Probably 30 to 50 ft. would be the general strength of the veins now worked. These commonly dip down at a steep angle. Few have been thoroughly explored as to their depth; when worked to 200 or 300 ft. deep, other shallower veins have been started, except in the more important deposits. The veins are occasionally found in gneiss, at other times in granite, but generally separated from their granitic surroundings by a band of Helleflinta, which is usually only present in small quantities; at Persberg, however, the largest mine in Sweden, the veins descend perpendicularly in the direction of the dip. In some cases the veins descend perpendicularly, and in at least one instance (at Persberg) the vein, after so doing, makes an elbow at right angles, and lies horizontally. In certain instances the iron oxide is found interspersed in grains for some distance on either side of a vein, which becomes more and more rich as it approaches the centre, where is the purest part. The magnetite and hematite are found closely intermixed, the one highly magnetic, the other not affecting the needle, the ores being similar in appearance and constituents. Some masses of magnetite are much more magnetic than others, affecting the compass through 20 or even 50 fms. of intervening rock, whilst to some bodies of equally true magnetite the needle will not dip, though not more than 10 fms. of rock intervene. In several districts, especially in the Norberg Mines, and to a less extent in those near Nora, the ore has a very singular striped appearance, caused by numerous veins, or nearly parallel layers, of crystallized quartz lying amongst the ore. Mr. Smith suggests that perhaps electricity may have been the chief agent in the formation of these mineral deposits, as what might be difficult or impossible for fire or water to accomplish might, perhaps, be effected by electricity if we assume that currents may have acted in definite directions for long periods of time, segregating the particles of iron oxide, which exist in a slight percentage throughout vast masses of many Swedish rocks.

Although there is so strong a similarity amongst all the Swedish "Mountain" ores, there is generally a sufficient divergence in chemical composition to give a separate character to most of the districts, and to some of the individual mines. Pre-eminent for its purity is the best Bispberg ore, which contains up to 70 per cent. metallic iron, or almost a chemically pure oxide; only a small proportion reaches this high standard, the bulk of the output varying from 50 to 60 per cent. The mines, which are 30 miles south-east of Falun, claim an antiquity of 600 years; they are very small, producing under 15,000 tons per annum. Much the largest iron mines in Sweden are those at Dannemora, near Persberg, in Westmanland, the veins, of which the largest is 66 ft. at its greatest width, lie altogether in Helleflinta. The deepest workings are over 600 ft. below the surface, the largest 400 to 500 ft. The annual production has lately been between 50,000 and 60,000 tons. The ore rarely contains less than 50, and rises to 60, per cent. metallic iron; it is much valued for furnaces for its purity and freedom from deleterious ingredients; it commands a higher price than that from any other large mines, and, to a large extent, the iron ore market of that part of Sweden is regulated by its selling price. Persberg is said to have been worked for 300 years. The most famous of the main iron mines are those at Dannemora, in Westmanland, where the ore is worked to a depth of 600 ft. The annual production is under 25,000 tons, and has varied but little for over 20 years. The ore contains from 25 to 60 per cent. metallic iron; very little has over 50 per cent., and the average is much below; most contain sufficient lime and silica to be smelted without a flux; it has also about 2 per cent. manganese. The highest percentage ore does not make the best pig-iron. The mines have been worked steadily for four centuries; the largest is in three sections, the centre—an openwork—being the chief. The main vein is somewhat irregular; it has an average width of 100 ft., being 150 ft. at the widest, and has been explored 900 ft. in length in the open work, and 200 ft. in the adit. The ore is perpendicular or slightly overhanging, over 500 ft. in vertical depth. The bottom of this extraordinary mine was covered, during my visit in the month of August, with large blocks of ice. The veins lie in Helleflinta, of which there are several varieties; different trap rocks are present, with granite and gneiss. The production of the mines might be greatly increased, but they are held under a tenure that prevents more than a certain quantity being raised. The ore is never sold, but goes solely to the furnaces of the different joint proprietors. The largest owner is Baron de Geer, the representative of a Dutch family, which, in the 17th century, acquired a practical monopoly over the iron trade of Sweden; most of their works and mines have passed into other hands, but they still retain Lövsta, where is manufactured, from Dannemora ore, hoop L iron, the dearest in Europe of its class.

A new railway will shortly open up the GRANGESBERG mines district, in Dalecarlia, which, it is considered, may prove the most productive in Sweden. At present the mines are cramped by expensive transit. The ore in the most southern part of the district is of very high quality, and free from phosphorus; but this ingredient increases regularly in a northerly direction, until in the extreme north the ore is of little value. The mines round NORBERG, in Westmanland, produce about 70,000 tons per annum of ore, which contains from 45 to 50 per cent. metallic iron. Notwithstanding its large percentage of silica it makes good iron, the veins are from 20 to 50 ft. wide and lie in gneiss, but are separated from it by bands, on either side, of Helleflinta. About three years ago a new ore was discovered here, containing 35 per cent. iron and 20 manganese, which it was hoped might produce spiegeleisen; but it is understood that the experiments have not been successful. In the neighbourhood of NORA, in Örebro county, there are many mines; those at Striber are second only to Persberg in production, but the ore is the poorest in the district, with only 48 to 50 per cent. metallic iron, which is the deepest iron mine in Sweden—about 4 ft. below the surface has 68 per cent. metallic iron, and very much rises to 80 per cent. Much of the ore contains manganese, and is called "Manganese Mine" up to 9 per cent. The manganeseiferous ores almost always contain munda (sulphuretted iron); in some cases they have to be calcined twice to drive off the sulphur; they are also much more close grained in appearance than ordinary magnetite, and some become brown with two or three days' weathering. Many of the Nora veins are red hematite, which rarely contains over 55 per cent. metallic iron. Some of the magnetic veins have been proved over 1000 yards in length. For the Bessemer steel trade by far the most important mines in Sweden are those at SCHYSSHYTTAN, ten miles from Smögebacken, in Dalecarlia. The ore is a mixture of magnetite and iron, with a very large percentage of silica, and is much more siliceous than the ore at Dannemora and a few other localities, but nowhere, except at Schysshyttan, in any quantity. The combined minerals contain 50 per cent. iron and manganese; they produce, without the addition of any other ore, the highest class of spiegeleisen. To the south of the general iron district, near Jönköping, in Smaland, is the remarkable hill of TABERG. This hill, which rises 350 ft. above the level of the surrounding country, is a solid mass of close-grained serpentine, containing on the average about 30 per cent. metallic iron, and which is in appearance very like some of the hematite ores of the North. Two sides of the hill are perpendicular, and form quarries, whence has been taken for years the supply of ore for a dozen furnaces, which, altogether, have only an annual production of 3000 tons pig-iron. This iron has been found well suited for a few purposes, and is very tough, but the demand is limited. The heavy percentage of magnesia in the ore has hitherto been an insuperable obstacle to any large manufacture. Were this difficulty overcome this hill would be one of the most valuable iron mines in the kingdom.

All the mines are much alike in character, with the exception of Dannemora partly and Taberg wholly, as the mode of working is almost identical. The veins of ore are generally discovered by a magnet of peculiar construction, so made that the needle can dip as freely as a compass needle; as soon as these magnets come over a body of magnetic ore, the needle swings round and points downwards to the mineral. When the presence of the ore is ascertained a large hole is usually made down to the vein, which may be worked open for a short time, but as most dip at a steep angle, the ore is mainly obtained by mining. As the walls are solid only a trifling amount of timber is used, often none at all. The surrounding rocks are so firm that it rarely happens any are brought down by the constant blasting;

the whole of the mountain ores, without any exception, have to be blasted. The small shafts that may have to be sunk through overlying granite drift, are frequently of very rude construction, bound round with withes and, if not round, of no regular shape. The drainage of the mines gives much trouble; except where steam is unavoidable, hydraulic power is always used, and often the pumps are worked by bobs of immense lengths. Royalties in Sweden belong half to the landlord, and half to the discoverer of the mineral; but the former may take half the mine, if he elects to do so. On finding any deposit, in the case of iron by magnet or otherwise, an application is made to Government officials, termed bergmästare, who grants a certificate of ownership, should no adverse claim be presented and proved within a given time. These bergmästare, of whom there are ten, have each a separate district, and it is their duty to see that the laws are obeyed. They have very considerable power, and appear to settle almost all mining disputes. The value of the iron ores varies to a great extent, depending not only on chemical composition, but also to a very great degree on local position. It has to be remembered that the key to the Swedish iron trade is not the mineral, but the fuel supply. This latter has been annually growing in relative importance, until lately it has become the chief particular. Charcoal still remains, notwithstanding the importation of foreign coal and coke, the main fuel of the country; and as it deteriorates most materially in transit, the fuel supply determines the locality of most of the Swedish works, and the extent of the trade in Sweden is cramped by the cost of fuel, labour, capital, and means of transit. But every year now should lessen these deficiencies, and we may, perhaps not without reason, look forward to a not distant future, when the iron trade of Sweden will be of European importance, not alone from the quality, but also from the quantity, of the metal produced.

Dr. C. W. SIEMENS, F.R.S., opened the discussion upon the paper with some very interesting remarks as to the formations of the veins of ore, and said that there was a suggestion that the deposits of iron ore referred to had been caused by electricity; but he could not conceive any condition of things which would bring electricity into play in producing such deposits. The question, he considered, as to whether the ore had been deposited by hot water or by currents of electricity segregating the particles of iron oxide was still unsolved.

Mr. SIEMENS said he merely made the suggestion, and he could not see how the deposits were due to fire or water. Dr. Siemens was a high authority on such subjects, and if he thought that electricity could not produce the deposits he (Mr. Smith) should certainly not press the suggestion.

Mr. BROGDEN enquired if in the course of his investigations Mr. Smith had come across deposits of ore at the bottom of the Swedish lakes, which literally had to be fished out, as was the case in some parts of Russia?

Mr. SMITH replied that he had not seen any of those lakes, but he believed there were a great number of them having an ore of a superior quality.

Dr. C. W. SIEMENS, F.R.S., said that he had heard of Mr. Smith's description of the Swedish mines as exceedingly fair one, and correct in every way. Attempts had been made several times to export the ores from Sweden, particularly to Middlesbrough, but it was found to be too expensive. The country was a very extensive one, and unfortunately the ores were not found near the coast, so that he thought there was little chance of Sweden competing in that matter at present. The best Swedish ores were from 100 to 200 miles from the sea, so that there was great difficulty in getting them transported to the coast for exportation. Railways were, however, being made in Sweden, which would enable the ore to be carried to the coast or to the nearest seaport at a cheap rate; and the question of transportation was now favourably received by the people, who preferred to make articles for exportation.

Mr. G. J. SNEELIS said he agreed with Mr. Adamson that they wanted to find out the laws which led to such matters. He had given some attention to iron ores. He had one sample in his possession which was brought from America, which was carbonate at one end and a specular hematite at the other. Whether that specular ore had been produced by decomposition of the carbonate owing to the heat he did not know, but he thought it was the most likely explanation. He had heard of the decomposition of the ores in the Barrow district, and he was difficult to explain, and that was how the kidney ore had been formed. He believed it was formed by deposition in water. In a pool of water underneath a railway arch during the greater part of the summer he had noticed some very fine silt, and when the water had gradually dried up the silt very much resembled the kidney ore in form, and he thought that went some way towards explaining the peculiar formation of that ore. He considered that iron ores had been originally deposited from water, and he did not think that an electric current had had much to do with their deposition.

Mr. WHITLEY (Lancashire) thought that the iron ore had been deposited by the action of water carrying away vegetable essences, which were transformed.

The PRESIDENT, after other opinions as to the mode of formation had been given by Messrs. Giers and Maynard, remarked that allusion had been made to the possibility of lake ores being deposited by animal organisms, in the same way as coral rocks were formed; but, for his own part, he did not see how the explanation which had been given could be fairly applied to the formation of iron ore in Norway and Sweden, because that would presuppose the existence of considerable quantities of iron held in solution in the waters of the lakes themselves. He had never heard that that was the case, but he had heard a much more reasonable explanation of the question. There was no doubt that in all strata iron existed in considerable quantities, and immediately in contact with these portions of strata there was a vast quantity of vegetable matter. There was no doubt that the acids which were formed had the power of dissolving iron, but compounds of iron formed under such circumstances were of an extremely unstable character, and became rapidly decomposed by the atmosphere. This, of course, did not account for the magnetic ores or the pyritic ores; however, on the whole, he had no theory to put forward.

IRONSTONE MINING IN CLEVELAND.

BY A. L. STEAVENSON, DURHAM.

The writer remarks that there are features of general resemblance in mining throughout the world, yet each country, and every district, possesses peculiarities in circumstance and practice, which are interesting to observe and note. He explains that the seam is a stratified bed, varying in thickness from 15 ft. in one bed, on the north-east of the district, down to a few inches on the south and west, caused by splits and the intercalation of shale. The rise and dip of the seam is most irregular, and bears no relation to the surface configuration, frequently, as at Eston and Normanby, dipping 3 in. to the yard from the outcrop, where it is 300 ft. above sea-level, to 50 ft. and 100 ft. below sea-level, where it is the foot of the hill, and then rising as rapidly to the outcrops at the other side, while in some places faults or dislocations prevail to the extent of several fathoms.

Mr. Stevenson referred to the various workings; to the fact of the stone being chiefly got by blasting, and that some mechanical drills (the Villagepige, Burleigh, and Cranston) have been tried with indifferent success owing to the softness of the stone. As to the new explosives, he says that he has experimented with nitroglycerine, dynamite, pyrolyth, nitrate and chlorate of potash, Nobel's blasting oil, and many varieties of gun-cotton, and other compounds, but all failed, either through inefficiency or want of safety—in fact, not one of them, not even dynamite, will clear such a quantity of powder as can be easily demonstrated. He considers the Gubauf a clever arrangement of the centrifugal fan (which is an important admission from him, considering that the whole paper seems to have been written whilst the author was suffering from a very severe attack of bile), and with reference to aéro steam, he states that an experiment was made with the Normandy fan which formed an excellent test for the application of the aéro steam of Warsaw. When at work the fan has a perfectly uniform load, one common cylindrical boiler being just a little short of the power necessary to drive it, and it appeared that if any advantage could be gained by this system its effect would be easily shown, no benefit whatever was found. The work done here with plain egg-ended boilers is almost identical with that at Huntcliff, but the coal used are between four and five times more. As a rule, he continues, the engines and machinery are much such as are to be met with in mining districts, with a few exceptions. Bewick, in his book upon the Cleveland iron field, says "The extent of this mineral field is supposed to be between 500 and 600 square miles." This, however, is very wide of the mark, or about ten times as much as can be worked to profit, all the south-west portion being unfit for use. The discovery does not seem to have been the work of any single man. One saw it, recognised it, and made a note of it, but he did not go on to use it, he only used it to use it, failed, and gave it up. Whilst a third, taking advantage of what others had brought it into use, and completed the discovery in the year 1850. A quarter of a century has since passed, rival claims to be the leader in producing iron have been made, Belgium, Cumberland, Northampton, and even that high and dry part of the world, Cornwall, has been dinned in their ears, but while by no means sleep ing at our posts, they have seen nothing yet in any of these to cause the least anxiety.

NEW WAGON DROP FOR BLAST FURNACES.

BY T. WRIGHTSON, STOCKTON-ON-TEES.

The success attending the author's application of the hydraulic brake to the lowering of charges into blast-furnaces led to the application of the same principle to the lowering of wagons in the wagon drop. A framework, usually of cast-iron columns braced well together, supports an entablature, on the top of which is mounted a strong shaft with two large sheaves keyed thereon, to one or both of which is applied a powerful brake, worked by a lever from the upper rail level. The cage moves up and down in guides fixed to the framework, and is suspended by chains or wire-ropes descending from one side of the sheaves. From the opposite side of the sheaves hang heavy counter-weights, which are sufficiently in excess of the weight of the cage to draw it to the top when the wagon is not on. The brake is made so that it always presses upon the periphery of the brake wheels, except when the lever handle is raised. The author proposes to use water as the controlling agent in the drop. The cylinder is of the same length of stroke as the fall of the cage, and may be about 10 or 12 in. in diameter. The cage is attached to the piston by means of a long piston-rod working through a stuffing box at the bottom of the cylinder. At the top of the cylinder is a small supply tank, fitted with a self-acting ball-cock, to keep the same always supplied from the nearest water main. A small adjustable hole in the cover communicates with the inside of the cylinder to ensure that it is always full of water, and another small hole in the piston allows any air which may accumulate under the piston to escape to the upper part of the cylinder, where it escapes into the tank by the hole before mentioned. A pipe connects the top to the bottom of the cylinder, through an ordinary water-cock, which is controlled by the weigh bar and lever. A catch lever is placed alongside the valve lever, and serves to lock the cage as it comes to the top of its stroke. This holds the cage while the wagon runs on. When the cage with the wagon on is required to descend, the catch-rod is liberated, and then the valve handle lifted. By the opening of this valve the water passes from the bottom to the top of the piston, thus controlling the descent of the cage with the greatest nicety to any speed the attendant may choose. When the cage is at the bottom, a self-acting stop is removed by the action of the cage touching the ground, which allows the wagon to run off at the lower level. The cage being then lighter than the counter-weights, is drawn up again, the water in the cylinder during the ascent returning from the top to the bottom of the piston. When the cage arrives at the top of its stroke it locks itself, and is then ready for another wagon to be run on.

The bulk of the water passes and re-passes through the cock, but on account of the area of the piston being less by the area of the piston-rod on the lower side than

the upper, the water at the top, displaced as the piston rises, cannot find room at the lower side of the piston, and will, therefore, find relief by a portion equivalent to the cubical contents of the piston-rod passing through the small hole in the liner cover into the supply tank. In the same way when the piston again descends, there would be an equal deficiency in the water passing from the bottom to the top through the hole in the cover. By this means the cylinder is always kept full of water, which is essential to the successful working of the apparatus. It will be observed that the same water is used over and over again, and that the ball valve in the tank is merely to supply any loss from evaporation or leakage.

The author patented the hydraulic drop at the same time as the bell and hopper arrangement, but the cost always seemed an obstacle to its adoption. Mr. Alfred Wilson, of Middlesbrough, having, however, designed under the superintendence of Mr. Howson an arrangement with brick supports instead of cast-iron; this reduced the cost so much as to put the hydraulic drop under very favourable conditions for comparison as to cost with the ordinary drop. Mr. Howson agreed with the author to erect one at the Lincolnshire Iron Smelting Company's Works, at Frodingham, where it is now in operation. [A model was shown representing the diameter. The cost of this drop was under 4200 ft., including all brickwork.]

VALVES FOR HYDRAULIC MACHINERY.

BY ROBERT LUTHY.

The self-tightening leather collars and leather cups are up to the present time the only reliable packing for water under high pressure, but for pressures up to (say) 500 lbs. per square inch several other kinds of packing seem to answer well; but the parts to which this paper is particularly intended to draw your attention are the distributing valves or cocks required to work the different hydraulic apparatus. Some of these valves have to be of considerable size in order to give the proper speed to the machinery; for the tipping cylinders of Bessemer converters their ports are usually made proportionate to pipes of 2 in. bore, and for the centre ladle cranes they are even larger. The valves for the tipping cylinders have four ways, and these are usually only three. As the water from the pumps is generally sent up in an accumulator, it is necessary that all the valves be so constructed that there be no direct communication between the pressure and the exhaust side at any position of the valves—i.e., they must sufficient "lap" to prevent loss of water. The valve faces have to be held together with sufficient pressure to keep the water tight, and this causes considerable friction, and the valves are liable to become stiff.

Valves have been introduced in which the peculiar properties of the leather collars for making hydraulic joints have been applied to the best advantage. The body of the valve is bored and cored out, so as to form chambers communicating with the inlet and outlet pipes, and with the pipes for the crane or press cylinder. The ram or slide is turned to fit the smaller bore of the valve, and has recesses turned in it to form annular passages for the water, and carries leather collars, the outer lips of which work against the bored part of the valve. Inside the valve there are also stationary leather collars, whose inner lips make the joint against the larger portions of the ram. The leather seals are recessed in the ram and are so divided that in one position of the latter its larger portions are within the stationary leathers, and its moveable leathers within the smaller portions of the valve, thus preventing any communication between any two adjoining chambers; in a second position of the ram or slide, its reduced portions come opposite the stationary leathers, and thus leave an annular passage for the water from the inlet chamber to the chamber in communication with the cylinder; in a third position, the communication between the inlet chamber and the cylinder is again closed, and the leather on the ram is drawn within the chamber communicating with the cylinder, and thus allows the water to pass into the waste pipe and the waste chamber. In valves for working double-acting cylinders, the leathers and recesses are so arranged that one end of the cylinder is in communication with the pressure and the other end with the waste at the same time. The pressure on the ram in these valves is balanced in every direction, and in moving it only the friction of the leathers have to be overcome. As some of the leathers work against the body of the valve, it is necessary that this, as well as the ram, are made of brass to obviate corrosion, which would materially increase the friction, and cause the leathers, as well as the valve itself, to be quickly worn out. The ram has also to be made in parts screwed together, in order to secure the moving leathers.

With a view of making the body of the valve of iron, removing all the friction from the same, and limiting it to the ram, making all the leathers stationary and of uniform size, and the ram in one piece, and of such construction that it limits its stroke, and that, after removing the top gland bolt nuts, the gland and all the leathers can be withdrawn at one operation with the ram and quickly replaced, the author has designed an improved valve. On each side of the slide valve a mitre stop-valve is introduced, so that the water can be shut off from the pressure and waste pipes, when the leathers in the valve or in the tipping cylinder have to be changed, or any repairs done in the connection between the ram and the waste pipe, without interfering with the working of the other vessels or the rest of the hydraulic machinery connected with the same main ranges of pipes. This provision has great advantages, and should be made for each separate apparatus.

The valve-box is made of cast-iron, and has branches for inlet, outlet, and for the pipes leading to the front and back end of the tipping cylinder. It is bored out uniformly down to the shoulder on which the brass ring supporting the leathers and the distance ferrules for the same rest, and is fitted at each end with a gland through which the ram passes. The brass distance rings fit easily in the box, and are secured to the ram, and are turned to fit the cone of the gland and the cone of the leathers as required. Their central ports are bored out larger to give sufficient passage for the water to pass all round the ram, and they have ports in their sides to correspond with the branch openings in the box. The whole of the leathers and rings are firmly held in their places by the top gland, which is screwed down upon the common packing at the top. The ram, which is cast of hard bronze, is divided into a number of cylindrical pieces, connected by leathers or ribs of a cross section, forming passages for the water. The working portion of the ram is turned to a uniform diameter to fit inside the rings, and the rim at each side of it which are in contact with the rings, and the bottom of the ram is butting against the lower brass ring and the bottom of the lowest chamber when the ram is moved up or down. These projections serve also for withdrawing the whole of the rings and leathers with the ram when the gland bolt nuts are removed. The edges of the cylindrical portions are rounded off so that they may enter the leathers easily.

When the ram is in its central position, the solid portions are within every leather collar, and the valve is thus divided into five compartments. The water under pressure is in the central or inlet chamber, and cannot pass into the chamber on each side of it which are in contact with the ram and the bottom of the tipping cylinder respectively, as the lips of the leather collars are turned towards the centre and made perfect joints with the ram as well as with the sides of the box. The top and bottom chambers are connected by a passage at the side of the box with the outlet branch. When the ram is moved down into the position shown on the drawing, the water is admitted to the back of the cylinder through the openings formed between the ribs of the ram and the interior of the leather, at the same time a similar communication is established between the two upper chambers, letting the water from the front of the cylinder into the waste pipe. The ram is moved into its highest position, the pressure water is admitted to the back of the cylinder, and the back will be open to the waste-pipe. As the cylindrical part of the ram enters the top and bottom leathers from the inner or open side, the lip is protected from being cut off by being held back and secured in a groove, turned out of the brass ring, so that only about one-eighth part of an inch of the depth of the leather is free to make the joint with the ram. For the two inner leathers this is not necessary, as the ram enters them from the back by the round side; their lips are protected, however, from being bent in too much by the passing water by lips in the central ring. A few small holes are turned through the sides of the brass rings, to admit the water to the inside of the leathers. The brass rings being put into the box, the ram is turned to its position, and the corresponding ports in the box, a shallow groove is slotted down one side of the interior of the latter, and corresponding pieces to fit this groove are brazed to the outside of the brass rings. To prevent corrosion of the inside of the box, it is coated with a thin layer of copper, deposited by galvanic process. With a single cranked lever of one to twelve, a lad can work the valve with great ease. There is very little pressure in the waste-pipes, it is not necessary to open the ram through the bottom of the valve, a slight back pressure not being able to move the ram upwards, by overcoming the friction of the leathers and the weight of the ram. Many of these valves have already been applied to converters, centre-ladle cranes, lifts, reversing gear for rail mills, and presses for the manufacture of tuyeres for converters, and they all give great satisfaction. The leathers last a very long time, and if a valve has to be examined, or fresh leathers put in, it can be done in a few minutes.

The works visited on Wednesday were those of the Barrow Hematite Steel Company, and of the Barrow Iron Shipbuilding Company. At the former works the members were conducted over the different departments by Mr. Smith, the Mayor, and other local gentlemen. The works were seen in full operation. The steel works are carried on under three bays or roofs, each third 5 ft. between the standards, and 700 ft. in length. The ironworks consist of 16 blast-furnaces, but no finished ore is made on the premises. About 5500 tons of pig-iron is produced each week, including iron for Bessemer and founding purposes, and 3000 tons of steel per week. In the steel department there are eighteen converters, most of them of 7½ tons capacity. There are also twelve great steam hammers by Musgrave, of Bolton, and twelve patent engines for heating the iron before it is put into the converters. The chief product of the works is steel rails. The company have three large plate-mills, and engines between 3000 and 4000 horse-power. They raise 4000 tons of ironstone per month, and the great bulk of the coke—of which 1000 tons are used per week at the works—is brought from the South Durham district. At the works of the Barrow Shipbuilding Company the members witnessed the launch of a steam-tug, and inspected the Anchor, a new screw steamer of 5000 tons, which is being built for the Anchor line. In the drawing-office a sumptuous dinner was given by the Barrow Hematite Steel Company to the members of the Association, gentlemen at down, under the presidency of the Duke of Devonshire. Amongst his Grace's guests were the chairman of the Hematite Company, Mr. Leeds, M.P., Mr. Bell, Lord Frederick Cavendish, Mr. Hibbert, M.P., Mr. Jos. Dods, M.P., Mr. Brogden, M.P., and Mr. Fothergill, M.P., and all the most distinguished iron masters of this country, Belgium, and America. The noble Sovereign had ruled the toast of "Her Majesty the Queen," said that previous to the kind and genial reign of our gracious Queen. In a certain sense her Majesty's reign might be described as conducted with a rod of iron, for more iron had been produced in her Majesty's reign than had been produced from the earliest dawn of English history, and in no period had the production of iron a more powerful influence on the destinies of the world. The noble Chairman, in proposing prosperity to the Steel and Iron Institute, congratulated the members on the great success it had attained in the six years of its existence. He gracefully referred to the gathering of tenuous position which Barrow was placed in on being selected for the Belgians at Liège. He the mining world after the brilliant hospitality of the Belgians at Liège. He coupled the toast with the name of the President, Mr. Bell, of whose great services, not only to the Institute, but to the progress the iron manufacture in general, they were all well aware.

Mr. BELL, in acknowledging the toast, announced, amid cheering, that he was about shortly to visit America, and would report upon the best method of meeting the competition they were threatened with in that enterprising country. Mr. FOTHERGILL, M.P., proposed "The Town and Trade of Barrow," which was

pled by Mr. Smith, the Mayor of Barrow; and Dr. Siemens having proposed "the visitors," compiled with the name of Mons. E. Audrimont, the president of the reception committee at Liège last year. Mons. AUDRIMONT thanked the members for the enthusiastic reception accorded to his Belgian friends, and he expressed the hope that the affection the Belgians had for Englishmen was loving and profound. There was one strong bond of unity between England and Belgium, and that was the love of the great liberty; they could exchange their productions, their iron and their steel. Belgium loved England with all its heart, and he hoped that bond of friendship would be continued to the end of time.

The display of mechanical appliances, &c., was much inferior to those of previous provincial meetings. A large space was detached from the market place, adjoining the Town Hall, for the purposes of the Exhibition, and in the Town Hall itself was a large variety of ores and crystals illustrative of the geology of the West Coast. The majority of these varieties are described in the paper read by Mr. P. Würzburg. Mr. A. Fleming, of Glasgow, showed a new form of anemometer, which is a modification of that of Fletcher, and, like his, is intended more particularly for the measurement of the speeds of currents of air in the flues and chimneys of chemical and other manufactories. The apparatus consists of a U-shaped tube, but of very small diameter, being only about $\frac{1}{4}$ in. in the bore. This is much lessened at the bend in order to diminish the tendency to oscillation of the liquid it contains, which is ether. The tube is 10 in. in length, and is not placed vertically, as in Mr. Fletcher's instrument, but is laid at an inclination of 1 in 10. Each limb is furnished with a scale of inches and a vernier, by means of which the difference of the levels of the liquid in them can be read off easily and accurately to 1-100th of an inch. The verniers are partly of glass, and overlie at once the scale and the tube, enabling the reading to be taken with great precision. The ends of the tube are terminated by a two-way stop-cock, by which their communication with the tubes placed in the current can be reversed without disconnecting any portion of the apparatus. The whole is mounted on a suitable stand, furnished with a level and levelling screws. Messrs. Twiss and Garbutt, of Bradford, exhibited Root's patent rotary blower, of which above 1000 are now in use.

Mr. Frank Pearn, of Manchester, showed models of his double-acting steam-pumps with one ram, of which a number are in operation both in Lancashire and Cumberland, and were seen at work in the course of the excursions to the Hodbarrow Mines, to Askam, and to West Cumberland. The advantages claimed for these pumps over the double-acting piston-pumps are that they can be packed in a few minutes in the simple way as single-acting ram pumps with ordinary packing, without being taken to pieces; that the pumps are easily managed; and that the ram cannot be injured by unevenly screwing down the gland. The columns of these pumps support the steam cylinder, and act as air vessels. The cylinders are fitted with metallic pistons; the piston, valve, and pump-rods are of steel, working through brass glands and bushes; the stroke is limited by a crank; the valves are of brass, and lift vertically, each being provided with a separate door. A model of Field and Cotton's patent direct expansion compound steam-engine, which can be used without crank or fly-wheel. Mr. Cranston, of Newcastle-on-Tyne, exhibited his patent rock-drill, which is said to be coming into general favour in the North of England, being at present applied to the works on the Tyne, carried out in connection with the erection of the Tyne Bridge. Mr. Wrightson, of the Teesdale Ironworks, South Stockton, exhibited a model of his new form of wagon drop for blast-furnaces. Mr. Robert Luthy showed his valves for working hydraulic machinery. The last two inventions are described in the papers of which abstracts have just been given.

TECHNICAL EDUCATION—No. IV.

THE ROYAL SCHOOL OF MINES, LONDON.

Although generally designated a School of Mines, owing to the circumstances of its establishment, and to the connection with the Government Geological Survey of most of the lecturers, the educational institution originally located, and indeed still partially located, in Jernyn-street, is really a Polytechnic School, and there can be little doubt if it were so called the number of students who would avail themselves of the excellent instruction offered there would be much greater. As a School of Mines the establishment has always been, though certainly without just cause, unpopular, and the result is that, notwithstanding its having been in existence for nearly a quarter of a century, it has never acquired that position to which the attractions of a well-paid staff of professors, and many valuable scholarships and prizes, entitle it. Miners generally feel that the scientific instruction obtained there does not make the student a more competent mine manager, and those engaged in other branches of industry do not care for a title which appears to connect them with a profession with which they have practically no concern. If, however, the institution were known as a Polytechnic School the case would be altogether different, and its utility would be appreciated by a much larger class of the community. The professed object of the Royal School of Mines is "to discipline the students of the School thoroughly in the principles of those sciences upon which the operations of the miner and metallurgist depend," but as there are now chairs of biology and of organic chemistry, it will be seen that the School goes beyond the requirements of miners, and is in a position to furnish quite as much technical instruction as is required in most branches of industry.

That it would be of immense pecuniary advantage to Cornish miners to possess the scientific knowledge obtainable by pursuing the course of study forming the curriculum of the Royal School of Mines is well known, if not willingly admitted; but there are really few practical mine agents who have either the time or money at disposal to attend the School themselves or enable their sons to do so; and since as mine managers the associates of the Royal School of Mines at the age of 21 are infinitely less useful than those who have been engaged from their boyhood in mines (though if it were possible to take young miners of 18, and supply them with three years scientific instruction, their value as mine managers would be enormously enhanced), the association does not command the respect of the working miners for the student holding it, nor does it ensure remunerative employment from mineowners. The consequence is that it is rare to find the students of the School having the control of mines in this country, nor, unless as metallurgical chemists, occupying prominent positions in connection with the mining profession. Nor does an examination of the list of officers of the Geological Survey afford any better evidence that the association commands remunerative employment, for no associate is found amongst the directors or district surveyors; of the 14 geologists only 2 (Messrs. J. C. Ward and B. N. Peach) appear to be associates of the School; and if any of the assistant geologists, of whom there are 24 in England and Wales, 6 in Scotland, and 9 in Ireland, be associated the honor is but small, since the executive of the School consider the rank of assistant geologist so unimportant that they do not give their names in the official list. As a School of Mines, then, the institution is decidedly not a success; but as the ability and position of the educational staff is beyond question, it would seem to be well worthy of consideration whether by remodelling the establishment as a Polytechnic School, and reducing the present fees by one-half, it could not be made a vigorous and self-supporting institution without lessening its value to those connected with mines.

For a Polytechnic School the classes could scarcely be better arranged than they are at present, so that little more than the alteration of the name would be required to make it attractive to a largely increased number of students. The syllabus of chemical lectures leaves nothing to be desired, since in the course of lectures both mineral and organic chemistry, each considered practically as well as theoretically, are dealt with in the most systematic manner; and although Dr. Frankland may have some peculiar notions, and may have increased the already great confusion by creating another system of notation, he is a thoroughly sound chemist, and well teaches those who attend his classes. This is really all that can be done at any school, for, as it is remarked in referring to the chemical laboratories at the disposal of the students, the fundamental studies in practical chemistry are the same for all pupils, however different the future pursuits may be to which the knowledge obtained may be applied. It is only after the most important methods of dis-

tinguishing, separating, and estimating substances have been mastered, and after sufficient practice and skill in experimenting have been acquired, that the course of each student diverges into some special line. The syllabuses of the physical and biological lectures are also well arranged, and are certainly better adapted for a Polytechnic School than for a School of Mines, in proof of which it would suffice to refer to one or two of Prof. Huxley's examination questions. For example, "Describe the organs of circulation and respiration in any elasmobranch, and compare them with those of any teleostean fish." Or, taking what he calls the practical examination, he requires the student to "make a preparation of the rectum, the urinary bladder, and ureters of the same animal (that which has been supplied to the student for dissection), showing the external apertures of these organs." It must be acknowledged, however, that the latter question may be of use to mine captains desirous of demonstrating the value of the *Arschleder* (perhaps Prof. Huxley would add the *capote* also), with a view to its introduction into this country. The palaeontological demonstrations of Dr. Etheridge are, of course, valuable to coal miners, and others mining in the stratified rocks, but the syllabus is equally well adapted for Polytechnic students.

The courses of lectures on mineralogy and mining given by Mr. Warrington Smyth, and on geology by Prof. Ramsay, are, no doubt, more directly addressed to mining students, and are so eminently practical in character that they could scarcely be improved, but with the exception, perhaps, of the mining course the whole of the lectures would be equally valuable to the polytechnic student. The mineralogical course embraces crystallography, the physical properties of minerals, the elements of mineralogical chemistry and physiography, and the geological course is at once comprehensive and exhaustive. The classes of metallurgy, applied mechanics, and mechanical drawing are also excellent.

Meetings of Public Companies.

THE PORT NIGEL LEAD COMPANY.

The first ordinary general meeting was held at the offices, Abchurch Chambers, City, on Monday.—Major E. J. CHARTER in the chair.

Mr. MITCHELL (the secretary) read the notice convening the meeting, and a highly satisfactory report from Capt. Manley, the agent at the mine, was also read.

The retiring directors, Major Charter, and Messrs. T. Gundry, M. Crowe, and J. E. C. Mathews, were unanimously re-elected to office; and the proceedings (which were of the usual formal character) closed by a vote of thanks to the Chairman for presiding.

ROSSA GRANDE GOLD MINING COMPANY.

The annual general meeting of shareholders was held at the London Tavern, on Monday.—Mr. LLOYD FOSTER in the chair.

Mr. DAWSON (managing director) read the notice convening the meeting. The report of the directors was taken as read.

The CHAIRMAN said the voluminous report submitted by the directors contained all the information they had to communicate. The report had been thus prepared in order to enable the shareholders to see the exact position in which the company stood. They had been led on from time to time to believe that the mine was a very good one, and that when the stamps were erected the produce would yield a certain percentage of gold per ton, enabling the return of considerable dividends to the shareholders; but after the stamps were erected the result did not prove to be satisfactory. All this information, however, was embodied in the extracts from letters which the directors had appended to their report, so that the shareholders were as well able to judge of the position of the company as they were. He did not propose to enter further into the question until he submitted a special resolution bearing upon the subject; and, therefore, would content himself by moving the reception and adoption of the report and accounts.—Mr. RECKITT seconded the proposition.

A SHAREHOLDER drew attention to the fact that 4000 shares had been forfeited.—The CHAIRMAN said the shares in question were forfeited years ago, and belonged to parties unable to pay the calls. The arrears of all amounted to 37%, the whole of which he believed would be paid.

Mr. DAWSON, in reply to a question, stated that the following was approximately the present financial position of the company:—Cash at bank, 381l. 6s. 3d.; gold at mines, estimated for June, 1000 oits., at 8s. 6d., 425l.; O. S. call, 376l. 18s.; capital uncollected, 80,960 shares, at 1s., 4048l.; equal to 5231l. 4s. 3d.; Bills, 75l. 10s.; estimated debts at the mines to June 30, Rs. 20,866 863, at 25½d., 2117l. 8s. 5d.; equal to 2292l. 10s. 5d.

Mr. ATRELL thought that before the report and accounts were adopted the shareholders should know what proposition the directors were about to make.—The CHAIRMAN said he was about to propose that the directors be requested to have the company's property further examined and reported upon, and that the present meeting be adjourned until such report had been received.

The CHAIRMAN said that the reason the directors had given such a full report was to show that up to the present time they had been deceived in what they considered to be the value of their property. The directors had no other means of bringing the facts before the shareholders. They had been told that the Bahu Mine was worth at one time a great deal, because a small number of tons taken out fairly as samples had yielded 40 oits. of gold per ton, but from that the produce came down gradually. Had the mineral yielded the produce represented regular dividends would have been commenced long before now, and it had only been by information the board had forced from the manager that they were able to arrive at any real reason why the results had been different to those anticipated. As far as could be learned, the truth appeared to be this—at first the disappointments were attributed entirely to the want of water, which, no doubt, had been exceptional. After the stamps had been got thoroughly to work the mineral fell off in value, which could only arise from one of two causes—either that was less rich than it had been represented, or that the workings had not been carried on where the gold was believed to be in large quantities. It had now come to this, either that the company must be wound-up, or that an independent opinion from a reliable authority be obtained upon the property. He had had an interview with the Chairman of the St. John del Rey Company, and had asked that gentleman if he would allow Mr. Gordon, their manager, to inspect the property of the Rossa Grande Company. That was so long back as the middle or end of January last, and as Mr. Gordon was expected in England in June this meeting had been postponed for that purpose. But Mr. Gordon would not visit this country until next year; he had, however, been to the property, and he (the Chairman) believed that Mr. Gordon had to some extent formed a favourable opinion upon it. Mr. Gordon was the most competent man to give a report, and his opinion could not fail to be of the greatest value to the shareholders. He had omitted to mention that Mr. Hocking, the Chairman of the St. John del Rey Company, objected to their manager reporting upon any mine, but kindly consented to submit the matter to his co-directors, who had signified their intention that, while they did not object to Mr. Gordon inspecting the property for the private information of the directors of the Rossa Grande Company and their friends, the report was not to be published. The reports that had been received up to the present time stated that by the expenditure of from 10,000l. to 15,000l. to provide the necessary means of working the property upon a large scale—in other words, by treating large quantities of poor stuff, instead of a small quantity of rich stuff—dividends would be realised. But the directors were not at all certain that this was really the fact, because it might be that there was rich ore in large quantities that had been to some extent worked, and it was extremely difficult to know whether the mine had been fairly worked at all, and he knew no person better able to give an opinion on that subject than Mr. Gordon. He had written to Mr. Gordon, asking him to make a report, and he had expected a reply by the present mail. As further capital was required, he was most desirous to have a reliable opinion upon the actual value of the property, and he would not ask the shareholders to assist him in subscribing it merely upon the data at present before them. He (the Chairman) believed the mine to be a thoroughly good one, and, if properly managed, would yield satisfactory results. Even taking the view that success would be realised by the treatment of a large quantity of poor instead of a small quantity of rich ore, he should be extremely sorry to see the shareholders sacrifice their property; therefore, he thought the better course would be to adjourn this meeting, in order to obtain the information necessary to guide them in the course that should be adopted. The expenses had been cut down to the lowest possible point, and the directors had done all in their power to assist the company in every way, and did not take any fees. Personally, he had devoted a great deal of time and attention to the property—as much, indeed, as if it were his own, and believed they had brought before the meeting the only feasible course to be adopted, by the resolution he intended to propose after the report and accounts had been received and adopted.

Mr. SCHOFIELD asked if the supply of water was extensive or only limited? As, from what had fallen from the Chairman, it appeared the only prospect of making the mine pay was to work the ore in large quantities, it was clear they must be able to obtain a good and continuous supply of water. He was associated with a Californian gold mine that yielded a profit upon ore yielding 35s.; and, as the Rossa Grande ore yielded 2½ oits. per ton, he did not see why they should not make it pay if there was plenty of water. But he thought all Brazilian mines laboured under the difficulty of obtaining labour.

Mr. SCHOFIELD said the force employed at the mine was very large considering the quantity of ore crushed, and added that the Californian mine to which he had referred 900 tons were crushed last month with a force of 54 men, or nearly double what was done at Rossa Grande. In California the cost was about 80p. per man. In Rossa Grande he found the cost for November was 117l., and if the mine could not be worked at a less cost than that, unless richer ores were obtained, and also a larger quantity of water, he thought all further attempts to work the property at a profit were useless. He suggested the attention of the inspector to these two material points.

A SHAREHOLDER said the whole pith of the question was embraced in the two points raised by the last speaker. Last year they were told the mine would pay

profits to the amount of 500l. per month, but the result had been they had lost more than 10,000l. in the year.

Mr. ATRELL asked if the report of Mr. Gordon were favourable the board would take into consideration the subject of superseding Mr. Dale?—The CHAIRMAN said that question would arise hereafter.

The motion adopting the report and accounts was put and carried. The CHAIRMAN then proposed that the directors be requested to have the mine further examined and reported upon, and the meeting be adjourned to Nov. 2, so that such report may be laid before the shareholders.—Mr. ATRELL seconded the proposition, which was carried unanimously.

The CHAIRMAN said if the report should be received at an earlier date the shareholders would be summoned together immediately.

A vote of thanks was passed to the Chairman and directors, when the meeting adjourned.

SILVER PLUME MINING COMPANY.

The half-yearly meeting of shareholders was held at the offices, Great Winchester-street, on Wednesday.

Mr. WILLIAM WADHAM in the chair.

The report of the directors stated that the shareholders were informed at the last meeting that the company's agent, Mr. Ernest Le Neve Foster, had commenced to work the mine on tribute, and made agreements with the miners, to whom they were indebted for back wages over 6000l., that they should work on tribute, and pay to the company 25 per cent. of their gross raisings, care being taken that a large amount of dead work was to be carried on by each set of tributaries, thus developing the property at no expense whatever to the company. The directors have great pleasure in drawing the attention of the shareholders to the fact that this mode of working the property has proved advantageous to the company, as shown by the following statistics:—Last year, ending Dec. 31, 1873, the gross amount of ore sold realised 3864 (702l.). The ore was produced under day wages and contract work, the cost far exceeding the value of the ore raised. For the six months of the present year, ending June 30, the gross amount of tribute ore raised and sold has been 28,211-82, or 5129l. 8s. 6d.; 25 per cent. of this, after deducting 244l. 15s. 11d. for mill charges, packing, &c., leaves 1128l. 13s. 1d., to the Silver Plume Mining Company, and has enabled the directors to diminish the debts of the company to that extent. This cannot but be considered a most satisfactory result, and has enabled the company to pay off several heavy claims. The back pay of the miners has been liquidated, which gives the men encouragement to push forward with vigour, and induces fresh lessees to come forward and take up workings, and open up other parts of the mine, thereby thoroughly testing and proving it at all points, which it would be impracticable for the company to do in any other way. At the present time there are nine different sets of lessees, some of whom are doing very profitable work, whilst others are at present only doing dead work, in hopes of ultimately tapping the mine at various points, and getting into as good pay ground as their neighbours. Last year the workings of the mine were chiefly confined to one level, or about 300 ft. of the lode. This year we are not only working in six of our original levels, but have commenced two intermediate ones, and are working the whole length of our property, about 2800 feet, with the exception of the Hickman lode (3000 ft.), upon which the company has, as yet, made no development, although it bears every indication of being a valuable mine. At the last meeting the directors informed you of their anxiety to settle with the bankers in Colorado, who held an overdue draft of the company for 3864 (702l.), and who became impatient for payment, and took proceedings against the company, and obtained judgment at the last term of Court. Interest was accruing on this draft at the rate of 2½ per cent. per month, which was ruinous; the judgment reduces the interest to the legal rate of 10 per cent. per annum. Our agent informs us that he has paid off all the interest to June 30, amounting to 2829-29 (368l. 19s. 3d.), and, in addition to this, 500l. has been remitted from London, reducing the debt to 527l., which Mr. Foster hopes to pay off out of the monthly proceeds, the bankers having agreed to take monthly payments. On July 11 Mr. Foster informs us by letter that he has further paid the bank a sum of 5700 (1287l.); but this amount does not come into the present account. The ore sales for six months ending June 30 were 125½ tons, of the value of 5208l. 5s. 7d., the average per ton being 228-25 per ton = 41l. 19s. All the ore raised has been sold to the local smelters, on account of the tributaries being anxious to secure cash payment. If the ore had been shipped, and sold in England on the company's account, without doubt the gross returns would have been enhanced very largely. In their recent deliberations the directors have had the able assistance of Mr. E. O. Wolcott, of Georgetown, Colorado, who has been the company's lawyer since its first trouble with the vendors. He has been in London on other business during the last month, and has given the directors much valuable advice, and has placed them and many of the shareholders in possession of a clear idea of the status of the company. He left by the last mail for America, and has undertaken to visit the vendors in Philadelphia, and make them an offer for the settlement of all matters in dispute, without prejudice to our present rights. If this cannot be effected the company have no alternative but to continue to defend the vendors' action in the Courts of Colorado. In conclusion, the directors desire to thank their agent, Mr. Ernest Le Neve Foster, for the great care and zeal he has displayed in the many difficulties he has had to contend with on behalf of the company during his term of superintendence.

The CHAIRMAN said that from the first time since he had occupied the chair he felt himself in a position to congratulate his fellow-shareholders upon the encouraging condition of their mine. It was increasing in richness as its development progressed, and it was very satisfactory to know that it was being worked on tribute, by which means, during the last six months, they had obtained a sum of 433l. 4s. 2d., which had enabled them to reduce the liabilities, and other liabilities had been paid off out of capital, and up to the end of June the debt had been reduced to the sum of 2117l. 16s. 5d. Since that time the directors had transmitted from this side the sum of 5000l., and Mr. Foster had paid off debts to the amount of 1287l.; so that the outstanding liabilities were now reduced to 2049l. This morning he had received a telegram stating that "23 tons, of the value of 5000l., had been raised during the week, and that the mine was showing well." That was exceedingly satisfactory, compared with the returns obtained in former times. During the whole of last year the value of the ore raised amounted to 702l., whereas the value of the ore raised during the past six months was 5129l. 8s. 6d.; of this 25 per cent. (after deducting 244l. for milling charges) came to this company. The company's debt to the bank is now reduced to about 400l. Their present only drawback was the threatened litigation with the vendors. He moved that the report and accounts be received and adopted.—Mr. WILSON seconded the proposition.

The motion was put and carried unanimously.

Mr. A. Wilson, the retiring director, was re-elected.

The CHAIRMAN mentioned that he had the benefit of working with Mr. Wilson, and could testify to his zeal and anxiety to promote the interests of the company.

Mr. G. Batters, the other retiring director, did not offer himself for re-election on account of pressure of business. Mr. Biffin was re-elected director.

Upon the proposition of Mr. J. CARR, seconded by Mr. SKEBLEY, a unanimous vote of thanks was passed to the Chairman and directors, when the proceedings closed.

IBSTOCK COLLIERY COMPANY.

The first ordinary general meeting of shareholders was held at the City Terminus Hotel, Cannon-street, on Monday.

Mr. G. N. WILKINSON in the chair.

The directors' report was taken as read.

The CHAIRMAN said, as the shareholders had taken the report as read, it would be simply necessary for him to make a few observations previous to putting the first resolution for the reception and adoption of the report and accounts. By the accounts the shareholders would have seen that the company is considerably indebted to the bank. There could be no doubt that this company suffered from the same fault under which a great many limited liability companies suffer—want of capital. If the company had more capital in its possession it would certainly have been very pleasant to have paid the vendor his amounts as they became due, and so realise the profits for the interest due on the mortgage, leaving the rest for division amongst the shareholders. Unfortunately, they were obliged to make use of the profits to meet the vendor's payments, as they had no other resources. But the directors thought they had succeeded in getting the vendor to make a material alteration in the mode of payment of the amounts, as they had told him that they had made a mistake in making the payments so heavy for the first year or two when they would be wanting to spend an amount of money in improvements, &c., and to pay a fair dividend to the shareholders. Mr. Whetstone, the vendor, was agreeable to this alteration being made if the solicitors saw no difficulty in the way. They had put out regularly about 350 tons a day, as against 200 tons when the company took possession of the colliery; and the manager (Mr. Watson) has assured the board that 500 tons could be taken out daily—in fact, nearly 500 tons in a day had already been taken out. At present the demand for coal is small, but the directors hope that with the winter season they will be enabled to put out the full maximum quantity, and they also hoped that the prices would improve. At present the company was suffering from the very high prices which they were obliged to pay the pitmen, and it was considered that the company was entitled to a reduction of from 20 to 30 per cent. on the wages lately paid. However, up to the present time only 10 per cent. had been taken off. There was an arrangement entered into that this company should have the same benefit in the price of labour as the neighbouring collieries, so that when there is a reduction at any of the collieries in the neighbourhood the Ibstock Colliery will share in the reduction. Those shareholders who had looked through the accounts might think it strange that the directors proposed a dividend when the company is in such apparent poverty, but the directors were advised that this line of policy would be the best one to adopt, as it would, doubtless, enable them to issue the unissued portion of the capital. Mr. Webb, Dr. Stallard, and himself, so as not to impoverish the funds of the company, were willing to take their dividend in shares, and, therefore, he did not suppose the 6 per cent. dividend would take more than 1000l. or 1200l., and if by that means they could get the remaining share capital allotted the shareholders would see at once that it would be advisable to do so. He proposed, in conclusion, that the routine business should be disposed of, and then, before the declaration of the dividend, the shareholders could make any enquiries they might think proper.

Mr. BRICKWELL proposed the reception and adoption of the report and accounts.

Mr. J. ANDREWS seconded the motion.

The CHAIRMAN, in the course of a short discussion which ensued as to the issuing of an annual inventory, and as to the manner of keeping the accounts, promised that a quarterly account should be sent to the shareholders, and that, if possible, the inventory should be sent to the shareholders annually.

The report and accounts were then adopted.

In the discussion respecting the accounts previous to the adoption Dr. THOMSON had suggested that the stock on hand should be taken at cost price until it was realised; that gentleman now proposed a resolution to that effect, which was se-

conded by Mr. ALSTON. On being put to the meeting the resolution was negative. The retiring director (Mr. Standing) and the auditor (Mr. Stallard) were unanimously re-elected.

The CHAIRMAN then said, with respect to the dividend, the company had not yet exhausted the kindness of their bankers, and if Mr. Whetstone—who had already given his word that he would—would alter the mode of payment to the proposed new scale, the directors thought there was every probability that the remaining unissued capital would be allotted. The original mode of payment was to have been 20,000, at once, 5000, in March, and 5000, in September. The company had already paid 10,000, and 1000, had been allowed off the total amount, so that they were still indebted to the vendor 3000, of the 20,000. Then, 5000, had been paid in March, and there was now 5000, due, of which amount the directors proposed to pay 3000, leaving the remaining 5000, to be paid over a period of six years. The vendor had agreed to this arrangement, provided his solicitor, as well as the solicitors of the company, sees no difficulty in the way. The company's solicitor, Mr. Billinghurst, assured the board that the alteration would be perfectly legal, and there was no doubt that the matter would be settled in that way to the great advantage of the company, as the dividend recommended had already had the effect of increasing the demand for shares.

Mr. MAY then proposed the confirmation of the interim dividend in February last, and the declaration of a dividend at the rate of 6 per cent. for the past half-year, free of income tax, as recommended by Mr. Lowe, seconded by the motion, which was carried, notwithstanding negative proposition by Dr. THOMSON.

The meeting terminated with a vote of thanks to the Chairman and directors.

CARMARTHENSHIRE ANTHRACITE COAL AND IRON COMPANY.

The second annual general meeting of shareholders was held at the City Terminus Hotel, Cannon-street, on Saturday.

Mr. JASPER WILSON JOHNS in the chair.

Mr. G. J. M. AITKEN (secretary) read the notice calling the meeting. The CHAIRMAN said that no one regretted more than the directors that the accounts were not of so satisfactory a character as when they last met the shareholders. The directors had endeavoured to make the report tell its own tale. The board held the bulk of the property, and had not parted with any of their shares—in fact, he believed they held more than at the time of the last meeting, but, therefore, the shareholders could judge that the disappointment of the board was certainly great; but no one knew better than one gentleman present amongst the shareholders that in an undertaking of this kind they could not always order things exactly as they liked. The directors had given great time, care, and attention to everything that had been done. They had had to make some alterations at the works in the way of management. He must ask the shareholders to remember that these accounts were only up to June of this year, and many matters had occurred since then which placed the company in a better position than they were apparently at the period, and if any shareholder called at the office he would see that all that had been done had been done in the right direction, and that the directors had not laid out a shilling which would not, in due time, be productive, and that everything had been done with the greatest care for the interest of the company. There had been strikes, and the company had had slight differences with the men; there had been holidays which the colliers would always take at certain periods of the year, and this had resulted in the output being less than was expected, and of course had also increased the cost price of the coal. He did not suppose it would be necessary for him to go very fully into the details of the report, but he should be happy to answer any questions which any shareholder might put. The directors had nothing whatever to conceal, and their only regret was that they were not able to offer the shareholders a dividend on the present occasion, but, as they would see from the report of Mr. Rosser, the well-known mining engineer, a short time would see the company in a different position. This company was at the present moment able to compete with any of the collieries in the anthracite district, and could raise as large a quantity and as fine a quality. They were all aware the making season came on at a particular time of the year, and at the other period there was a slackness in the demand for anthracite coal; there was a large stock of coal at bank, and now that the making season was coming on no doubt that would quickly disappear, and the mine would be in full work; and in due time the directors would present the shareholders with a very different and more favourable report. He moved that the report and accounts be received and adopted.

Mr. W. M. BIRD seconded the resolution. Mr. BRIGHT complained that the losses held out in the prospectus had not been fulfilled, and that a very much larger amount of money had been found necessary to develop the property than was therein stated to be necessary. He thought it was not creditable to the management that the working had only resulted in a profit of 512. He contended that the company was at the present moment really insolvent—(No, no)—because if even all the unissued capital were paid there would not be enough to meet the liabilities. As he made out by the constitution of the company, the company's interest were entirely subservient to the interests of Messrs. Bird. He also understood that Mr. Jones, one of the directors, was opposed to the policy of the rest of the board.

Mr. SPENCER proposed that the report be not adopted, stating he was not aware that there was a clause in the agreement which made the company subordinate to Messrs. Bird. He asked what was the getting price of the coal at the colliery? He believed the company possessed a good property, but he certainly was not satisfied with the results which had been obtained, and thought that the output ought to have been much larger. He hoped no more money would be spent unless the shareholders were called together and consulted.

The CHAIRMAN said Mr. Bright was utterly mistaken in supposing that the company was in any way subordinate to Messrs. Bird; those gentlemen were appointed sales agents to the company at a percentage, and everybody knew it, and everybody was glad of it, because it was felt that their management in that department would be of great benefit to the company, and such had proved to be the case. The average price at which the coal was taken was 9s. 9d. per ton; that was taking it through and through—part culm and part coal—but the directors hoped the price would be considerably increased when they came to sell it.

Mr. SPENCER said he was perfectly satisfied with the price at which it was taken. The CHAIRMAN went on to explain that the cost of developing the colliery had been more than anticipated in consequence of the money which had been spent on the new pit and new engine, which were productive works. They had also had to sink on air shaft. He was not aware that there was any difference with Mr. Jones with respect to the policy of the board.

The SOLICITOR corroborated the statement of the Chairman that there was no clause in the Articles which rendered the company subordinate to Messrs. Bird. Mr. JONES said that the large stock of coal in hand arose in this way: previously there had been a large local trade at Llanelly for the three adjacent counties, apart from the English and shipping trades, but his colleagues were not disposed to push the local trade, thinking, no doubt, that they could do a larger wholesale and foreign trade. Now, therefore, the local trade had been delivered up to speaking about, hence the large stock of coal on hand. For his own part, he should be glad to see the local trade continued, and not abandoned.

The CHAIRMAN said they had never refused to sell locally, but the local trade had simply not been pressed, and the travellers had not been stopped. He might mention that the only bad debts which had been made were local debts, and not a single shilling of bad debts had been made in other directions; and the board thought that it was better to get out of the two penny half-penny local trade, and go into a steady trade of 4000 to 5000 tons contracts, and, as a matter of fact, but for certain circumstances these contracts would have been delivered.

Mr. J. BIRD went at some length into the circumstances connected with the position of the company, and the connection of his firm with it, and corroborated what had been stated by the Chairman and solicitor. He expressed his full belief in the future of the colliery. There had been a change of management, and they had now a good manager, and the directors hoped the next time they came before the shareholders they would show much better results.

After some further unimportant discussion Mr. Spencer withdrew his amendment, and the resolution was put and carried.

The auditors were re-appointed, and a vote of thanks to the Chairman and directors closed the proceedings.

WILLOUGHBY MINING COMPANY.

An extraordinary general meeting of shareholders was held at the office, Austinfriars, on Wednesday, for the purpose of passing resolutions to the effect that the company be wound up voluntarily; that Mr. Joseph John Pyne be the liquidator; and that he be authorised and directed to transfer and sell to a new limited company, intended to be formed, the mine, plant, &c.

Mr. W. C. BULLER in the chair.

It is intended that the new company shall be formed and incorporated under the provisions of the Companies Acts, 1862 and 1867, within four months after the confirmation of this resolution, in 12,000 shares, of 12 each, whereof 6000 shall be created as free or fully paid-up shares, and 6000 as ordinary shares; and that in the allotment or appropriation of the said ordinary shares preference shall be given to the shareholders of this company, so far as they shall apply for the same on the terms and within the time to be fixed by the directors of the said intended company; that the consideration for the purchase of the premises shall be 10000, in cash, and 4000 free or fully paid-up shares; that by way of further consideration the company shall contract to issue and allot to the subscribers for ordinary shares in the said intended company free or fully paid-up shares in the said intended company at the rate of one such free or fully paid-up share for every three ordinary shares subscribed for by them respectively; provided, nevertheless, that no person shall be entitled to demand or receive any such free or fully paid-up shares in respect of the ordinary shares subscribed for by him until the sum of 10s. per share on such ordinary shares shall have been actually paid.

The LONDON MANAGER read the notice convening the meeting.

The agent's report was read, as follows:—
Aug. 31.—As you are aware, we have not been able to do anything to alter the features of the mine since my general report through the water being in, except the deepening of the No. 3 and No. 4 shafts on Goddard's lode, both of which, I am glad to say, are producing well. We have just put the stuff through the grate from the No. 4, and it looks well on the floors. I expect 4 tons of ore out of this lot, and we have a lot equally as good to come from the No. 3. This has been raised by four men on tribute. I need hardly say that these places will not continue to yield at this rate long without opening up more of the ground by driving and sinking. The No. 3 is now 7 fms. from surface, and the No. 4 3 fms. Thus you will see that the 13 fm. level, if extended south, has the prospect of opening up two additional runs of ore, the No. 3 being 8 fms. south of the present end, and the No. 4 20 fms. We commence working in the stopes below the 13 fm. level to-mor-

row, and I expect the bottom levels will be clear for us to resume the driving of the 23 north and south on new lode. We have about 10 tons of lead and 40 tons of blende at surface. If we are able to get up the stuff from the stopes in time we shall have 15 tons of lead to sell with the 40 tons of blende in time for our next sampling.—H. NOTTINGHAM.

The CHAIRMAN proposed that the resolutions be passed. Mr. YORK seconded the proposition, and stated that the scheme proposed was the most feasible one that could be adopted, and the best for the general body of the shareholders.

Mr. J. J. PYNE had been at the mine within the last three weeks. He found that Goddard's lode was looking exceedingly well near the surface. A continuous run of ore ground for at least 30 fathoms had been proved, with every prospect of making very good returns of lead and blende. It was proposed to continue the 13 fathom level as speedily as possible, and drive in under this run of ore that came down from surface. The new lode in the 23 had improved in value, worth now 2 tons of lead and from 1 to 1½ ton of blende per fathom. It was computed that about another fathom driving in the cross-cut at the 23 would reach the caunter lode, and from its appearance there was every indication that it would prove rich. He was sorry more shareholders did not personally visit the mine, because he was perfectly satisfied if they did they would immediately subscribe the small amount of additional capital necessary to bring it into a dividend-paying condition.

The CHAIRMAN asked Mr. Pyne if Capt. Nottingham (the manager) had expressed any opinion as to the amount of capital requisite, and what returns would be made?—Mr. PYNE said the costs could now be met by the returns, but it would not be working the mine fairly; under any circumstances, he thought the costs would be met within 1000, per month. He believed 20000, would be sufficient to develop the mine and bring it into a profitable condition.

After some further discussion, the resolutions were adopted unanimously. A vote of thanks to the Chairman and directors closed the proceedings.

THE EAST NANT-Y-MWYN LEAD MINING COMPANY.

The half-yearly meeting of shareholders was held on Aug. 29, at the offices of the company, Bristol. Major CASTLE, J.P., chairman of the board of directors, presided, and there was only a limited attendance of shareholders.

Mr. G. H. BOWYER (the secretary) having read the notice convening the meeting, and also minutes of last meeting, the same were confirmed.

The directors reported that since the adjourned half-yearly meeting of the shareholders, held on March 13, they had, in pursuance of the views then expressed, taken measures to obtain further capital by the issue of preference shares of 10, each, with a bonus share attached of like amount: 1047 shares were applied for and allotted up to the end of June last, since which some further applications for shares have been received. The operations at the mine have been resumed by continuing the sinking of the old shaft in conformity with the opinions of Capt. Northey and Capt. Francis, and the shaft has been sunk 2 fms. 1 ft., its total depth being now 51 fms., or thereabouts, leaving 4 or 5 fms. to complete the shaft.

Subjoined to the report was the statement of Mr. Trevithick, the manager, as to the progress and prospects of the mine:—Since our last meeting we have sunk our engine-shaft about 2 fms. 1 ft. It has been slow work, having occupied several weeks; but when we take into consideration the hardness of the ground, with the water we have had to keep with barrels, and the labour we had to put it in working order from the time we were idle to our commencing to work again, it is not so bad; and, providing nothing occurs, we hope in ten or twelve weeks from the time we have done deep enough to drive west under the lead ground. The lode we have gone through in sinking is large, and it has shown and produced some strong and good stones of potter's lead, not to value; but from indications we have west of our shaft I think we may expect better results, which we shall, when we are deep enough, aim at and drive to with all possible speed. From the general opinion I think we need not differ, but say we have a kindly piece of ground before us. I am pleased to say that up to the present our machinery has worked well and without a single mishap, and we hope, as heretofore, it will keep the water out of our mine, and which I think we need not fear.

Mr. M. Jones, the agent at the mine, reported to the following effect:—“The present depth of the engine-shaft below the 25 is 5 fms. 5 ft. 6 in., and we are through the lode of 10 ft. wide, underlie 15 in. to the fathom, and appears to be a very progressive lode. While we were sinking through this we had fine branches of silver-lead ore, of which there is a pile on surface, and at the west end of the shaft the lode increases very fast in size and value; and when you get your shaft down, and drive a little to the west, I can come to no other conclusion than that you will get a paying and lasting mine.”

The audited accounts showed that 15,592, 5s. had been received on 14,818 fully paid ordinary 10 shares, and 1887, 5s. on 1047 preference shares (5s. paid); there had been paid 1690, 5s. in anticipation of calls, and 47, 4s. 4d. for interest: total, 13,867, 19s. 4d. The expenditure had been 14,325, 7s., leaving a balance due to bankers of 457, 7s. 8d. The liabilities and assets showed 1385, 5s. calls in arrears on ordinary and preference shares; and sundry accounts due, 782, 14s. 7d.; balance in favour of the company, 602, 10s. 6d.

The proceedings were purely of a formal character. The reports and accounts were adopted without discussion, and the meeting closed with a vote of thanks to the Chairman.

GIONA SULPHUR COMPANY.

The annual general meeting of shareholders was held last week (Col. A. ANGUS CROLL in the chair), when the CHAIRMAN, in moving the adoption of the report and accounts, referred to the engineer's report upon the completion of the new and improved machinery and the union of the two properties, and said that from the date of the completion of the extensions the real business of the company commenced. He congratulated the shareholders upon the present position and future prospects of the company. Referring to the all-absorbing topic of brigandage in Italy and Sicily, he read a letter which he had written to the Earl of Derby, the Foreign Minister, on the subject. A dividend at the rate of 10 per cent. per annum was declared, leaving a balance of 4384, 13s. 7d. to be carried forward.

The letter alluded to is as follows:—

“MY LORD.—As Chairman of the Giona Sulphur Company, London and Sicily, I am under the necessity of respectfully inviting your lordship's attention (as Her Majesty's Minister for Foreign Affairs) to the exceeding social disorganisation and lawlessness as at present exists in the island of Sicily, whereby not only the lives and property of the islanders but also those of some of Her Britannic Majesty's subjects are, and have been, put in the greatest peril. Your lordship has probably observed in the columns of the *Times* and other journals statements of the 'rightful murders' and of the numerous outrages by brigands which have recently disgraced Sicily. But independently of these accounts I can, from own observation and experience, assure your lordship that the need is urgent for the prompt repression of the anarchy which now prevails there. During the recent journey to our mines in Sicily I found it absolutely necessary to travel with a numerous and expensive escort whilst attending to the interests of the sulphur company of which I am the Chairman, and in proof of this necessity I may mention that a party of 25 brigands had arranged to attack me and my escort, and would have carried their plans into execution had we not defeated their purpose by a sudden change in our route. This lawless condition of the country is involving British capitalists and merchants in heavy costs for the protection of their property, and in constant anxiety as to risks of injury and plunder. The Italian Government at Rome is, as your lordship is doubtless aware, most desirous of putting an end to this state of affairs; but owing to the disaffection of many of the adherents of the Vatican and of the priestly party, the latter with a view to embarrass the civil authorities are, as there is good reason to conclude, lending themselves to the assistance and promotion of lawless violence in some of the provinces, and especially in Sicily. Hence I believe that the Government of the King of Italy, which is particularly willing to protect and encourage foreign commerce within its dominions, and especially English enterprise, would be pleased rather than otherwise to have its hands somewhat strengthened by any representation and protests which Her Britannic Majesty's Government may, under your lordship's sanction, present to the Italian Government, be pleased to address to the King of Italy. Commending the subject to your lordship's favourable consideration, I am, my lord, with profound respect, your obedient servant.—A. ANGUS CROLL: Gramard Lodge, Roehampton, August 19.”

THE AUSTRALIAN MEAT AGENCY COMPANY.

The half-yearly meeting of the Australian Meat Agency (Tallerman's) Company was held, on Wednesday, at the offices, Cannon-street.—Dr. HARDWICKE presiding.

The CHAIRMAN referred to the loss the company had had in the sudden death of Mr. J. R. Stebbing, the ex-Mayor of Southampton, the chairman of the company, and expressed his deep regret at this calamity. In regard to the company's operations he congratulated the shareholders upon the dividend on this occasion, notwithstanding the fact that the first six months of the year had been adverse to general business. They had maintained the figures of the year shown as the result of the working—10 per cent. per annum. He showed that the growth of the trade was still continuous; the preserved meat trade—one of the staples of the company's operations—having risen from 4½ tons in 1866, value 321, to 17,601 tons, value 905,850, in 1872. In 1873 the quantity showed a falling off, but in 1874 it was again rising, for in the first six months of 1874 the tonnage received from Australia was 5250 tons, value 320,146, while in 1874, during the corresponding period, 7590 tons had been received, value 403,244. Besides the Australian trade in these meats South America and Texas had contributed to the trade, and Canada, Oregon, and California, as well as other meat-producing countries, were preparing to enter into competition with Australia in this industry of meat. The enquiry from the Continent for the meats continued to increase, and some foreign Governments were now regular purchasers through the company. The trade had been added to by the importation of turtles, containing, too, the green fat, as well as calipash and calipee, sent from the colony of Queensland, where it was abundant, and by preserved fruits, such as pine-apples, peaches, nectarines, &c., preserved in syrup. The wines of Australia, too, were now coming in perfection, and the company had been made the agents of the Murray Valley Vineyard of Mr. J. T. Fallon, whose wines had just been sold in the English market at a price equal to 65s. a pipe. The company, too, had received hops from Tasmania, and seeing that the samples were of fair quality, and, owing to the difference of the seasons, could arrive here some time before the new season's home-grown hops were ready for market, there was every prospect for a remunerative trade springing up in this branch. The Chairman also spoke of the increased consumption of the meats amongst the working classes in the large towns, it having hitherto been confined to the middle and upper classes, and he looked for a great impetus to the Australian trade generally in all the products of which the company was agent as the large town populations became acquainted with the trade.

Mr. W. C. MAX seconded the adoption of the report and statement of accounts, and the dividend at the rate of 10 per cent. per annum was also adopted.

Major DE WITTON alluded to the loss the company had had in the death of Mr. J. R. Stebbing.

Mr. J. F. V. Fitzgerald and Lieutenant-Colonel Money were elected directors in the place of the retiring directors, and 100 guineas were voted to the board for their services during the past six months.

A vote of thanks to Mr. Tallerman and the board closed the proceedings.

CALDECK FELS MINING COMPANY.—The half-yearly meeting of shareholders was held, on Aug. 27, at the office, Carlisle. Colonel Salkeld was in the chair, and there were present—Mr. Page, Carlisle; Mr. I. Robinson, Cockermouth; Mr. Calvert, Warwick Bridge; Mr. Arras, Wetheral; Mr. Bell; Mr. Brockbank; Mr. Wordsworth, Carlisle; Colonel Prevost; Mr. Saul (solicitor to the company); Captain Pollock (manager); and Mr. Gath (secretary). The Chairman, in moving the adoption of the report (which appeared in last week's *Journal*), stated that Mr. Noble, Mr. Brodgen, M.P., and Mr. Banks, three directors, had sent excuses for not being present to-day. He further stated that one of the directors had consented to come chairman of the company, and they would thus in future have a permanent chairman, who would be better able than himself to keep them acquainted with the working of the mines. The debenture stock ordered to be issued at the last meeting had all been taken up, and only 500, of it remained outstanding. He regretted the report was not more favourable, but they must remember that during the part of the last half-year the mines were under new management, the directors, owing to the dissatisfaction expressed, having thought fit to disperse with Captain Hawke's services.—In answer to a question it was stated that all the preference stock except 1200, worth had been converted into debenture stock.—Capt. Pollock said he thought the mine had good prospects, and he would endeavour to make them pay. In answer to Colonel Prevost, Captain Pollock stated that the lead in the mines was inferior; it did not realise even half what some Laxey lead would realise. He thought they had a better prospect with the copper. The report was adopted, and a vote of thanks to the Chairman passed.

ST. IVES CONSOLS.—The four-monthly meeting was held at the mine on Wednesday, the 29th (Capt. Apelin) in the chair. Capt. Apelin said the shareholders were aware that for some time past they had been stocking the tin, and they had now 75 tons on the mine. The agents' report stated that they had 23 pitches working, on tributes varying from 10s. to 14s. in 10. No call was made in answer to a question as to the difficulty of arranging operations amicably with Roswall Hill, Capt. Gilbert said he did not apprehend any difficulty. The intended knocking a hole to Roswall Hill as soon as it would enable them to work more easily. This was part of the agreement on the settlement of the difficulty. Capt. Nancarrow asked whether they intended to stock their tin for the future, to Capt. Apelin. The shareholders had rather lost the tin by holding the tin. Capt. Apelin said they intended keeping a stock of about 48 tons, which, however, will be produced in the future as they go. It was a matter of opinion as to the stocking of the tin, and nothing was easier than to find fault now. A long discussion took place as to the merits of the question of the miners smelting the tin they produced. It was stated that a smelting furnace could be erected for less than 2000, and several of the adventurers expressed their dislike of the present system in numerous terms, but others thought the shareholders would do better by letting matters remain where they were.

SPEARN MOOR (St. Just).—A meeting was held at the mine on Tuesday, when the prospects of the mine were considered so favourable that the accounts were passed, and no call was made. The increased returns are largely due to the amalgamation of Spearn Consols with Spearn Moor, which took place at last meeting. Future meetings are expected, even with the price of tin show more favourable results.

For remainder of Meetings see to-day's *Journal*.

PERKINS BEACH.—In concluding an elaborate report, prepared for the ensuing meeting, Capt. S. M. Ridge says:—“I strongly advise to your notice the desirability of sinking a new engine-shaft in the place I have recommended near the mouth of the deep adit level, and near the dressing-floors. This I propose to sink perpendicularly, and sink it down below the deep adit level 60 fms., but to drive out and out the spar lode at every 20 fms. length in sinking, and by so doing I have no doubt but we shall drain the whole of the eastern workings gradually as we go down. I consider the steam-engine upon the present engine shaft to be quite sufficient power to pump and wind on the proposed new shaft to sink down 100 fms. below our deep adit level, and if the proposed work shall be done out in a workman and mining like manner, and the levels extended out when the shaft is down upon the course of the main lodes, both east and west in the settled and mineral bearing ground, I am in no fear but you will have a fine lead mine in depth as any other in the whole district of Shropshire. But one thing I do really consider wise to lay before your notice, and consider it wise on your parts to drive the set into two mines, as there is quite sufficient scope of land for two mines, and both properties are good in my view, and will make good mines, but depth is required and the necessary capital to lay them out. We have about 5 tons of tin ore dressed up, and about 2 tons on the flooring to dress up.”

OLD MINE SHAFTS.—The recent action taken by the executive duly appointed to carry out the Government instructions regarding abandoned mine shafts appears to have aroused the owners of mine sets and proprietors of land, and sense of their obligations to the public, and we now see on every hand men engaged in putting up fences round those abominable pitfalls. The danger to which we have been so long exposed is only now being made manifest, for there are apparently old shafts everywhere, and how we have not all been literally swallowed up is a problem we must hand over to a debating society or the British Association for solution. In the meantime, and with one accord, let us propose second, and a vote of thanks to Dr. Foster for the fearless and determined manner in which he has carried out his instructions, and caused the law to reach those who have defied the question of their liability to prosecution behind every species of watergate until they are now fairly unearthed and legally fixed.—OBSERVER.

TRELEIGH WOOD.—The lode on the north side of the 44, west of engine-shaft, has greatly improved, and is worth 25s. per fathom, with more lode standing north. The agents state they have the largest and best rocks of tin from the stone ever seen in the mine.

WEST POLDCIE.—It is stated that a rich lode has been cut at the bottom of the 32 fm. level, and that some very fine stones of tin have been raised and may be seen at surface.

THE RED RIVER.—The recent drop in the tin standards and the present depressed price of tin will make a very considerable difference to the workers on the Red River. The largest worker on these streams is Mr. Edmund Perry, who returned tin to the value of 4500, in 1873, and paid Mr. Bassett's debt alone 567,—twice as large a quantity as any other worker. Mr. Perry's floor is just below West Seton Mine. It is said that he invested money for four years or so, and he took up no profit from his mines.

CORNISH MINE SHARE MARKET.—There has been more business done in the share market during the past week. As we anticipated, there was a fall of 2s. in the tin standard on Monday, but, strange to say, shares advanced, and a much better demand for tin shares sprang up. This is explained by the fact that Straits and Banca tin, as well as Australian, improved in the London market, which has since continued firm. The setting on Friday and Saturday was not a very heavy one, and was without any special feature of interest, it was except the great scarcity of Tincofts and one or two other mines through “Welling” operations. Tincofts, Dolcofts, West Bassets, West Frances, West Tolgus, Carn Breas, and Cook's Kitchens have been pretty largely dealt in. There is at the present time a good enquiry for most of the shares mentioned. The market closes steady. Much continues to be spoken and written respecting the falling off in the duty of Cornish mine engines, and considering how far we are behind in this matter it is not to be wondered at. We are told the engines are bad, that the enginemakers are incompetent, but neither the engines nor the enginemakers are so much to blame as the coal used—we will not say “burnt,” because it is a difficult matter to burn all that is sold in the county for coal. Formerly, the model days (which are so often quoted), when Cornish engines beat the world nothing but good coal was sent into our mines, but now—

The following are the closing prices:—A fair business has been transacted in Carn Breas, which declined at one time 51, 5s., but has since advanced to 54, 5s. There was a better enquiry for Cook's Kitchens, at 9 to 10, closing steady, at 10, 10s. Dolcofts have received a fair share of attention, and have been fluctuating between 42 and 46, closing 45, 4s. East Pool unaltered, 9½, 9½; East Lovels called 10½, 11; Providence, 3½, 4½; Rosewall Hill neglected, 3½, 3½; South Carn Breas has been moderately dealt in, at 2 to 2½, at which they remained all the week. South Condor now doing, called 3½, 3½. In South Crofts a little business has been done at 12, 12½. South Frances shares are scarce, and enquired for at 9½, 10. Tincofts have been largely dealt in at 20 to 30 in the early part of the week, but since 31, 2d in the latter, closing firm. West Bassets declined at one time 10, 10½, and advanced to 9½, 9. West Frances moved from 9½, 9½, to 10, 10½, and continued in good demand. West Seton called 18, 20, but no transaction reported. A good business done in West Lovels, at 60, 62½, where they leave off. Kitty (St. Agnes), 6½, 6½. In Wheel Unya little more doing, at 1½, 1½. Botallack flatter, 20, 25.—West Droghda

RAPID MECHANICAL COAL CUTTING.—A trial of coal-cutting machinery took place recently, at Haddington, near Edinburgh, when several apparatus were tried, and it may not be uninteresting to give a few details of the successful machine, which did some really good work. In response to the invitation of the Haddington Agricultural Society, a number of coal-cutting machines were publicly tested on masses of coal built and bolted together to resemble as closely as possible the face of a coal seam. Among the competing machines was one which had just been patented, and called the “Warpool” machine. It had, consequently, never been tried before. The motive power employed was compressed air at 35 lbs. per square inch, which put in motion a small horizontal engine lying along a wagon. The shaft was placed vertically, in order to communicate its motion by projecting wheels to a horizontal bar, held on bearings underneath, and set in motion by the starting of the engine. The bar was brought steadily back to its position at right angles to the wagon, and when it had just been started, it cut the coal in one hour (or 1 ft. per minute), the depth of the coal being 3 ft. and the width of groove rather less than 3 in., and it thereby secured the first prize in the trial took place in the presence of 20,000 spectators, and under the close inspection of many of the principal Scotch coalowners and colliery managers, who expressed themselves as well satisfied with the great superiority of this machine, and agreed to defray the expense of long and exhausting trials underground, with a view to its general adoption. A similar machine has recently been sent to Glasgow where it is now at work in a quarry under cutting sandstone. This ingenious apparatus is the invention of Messrs. Warsop and Hill, who have been extremely successful in equally novel rock-drill for mining purposes, which, besides the usual simple and portable, will do its work with compressed air at the pressure of 14 lbs. per square inch. The Warsop Rock Drill imitates the operation of hand-boring, inasmuch that the boring chisel runs with its point against the rock whilst it receives a rapid succession of blows from an air or steam-propelled hammer, of perfectly uniform force, and of a weight carefully adjusted to suit the endurance of the steel point.—Iron and Coal Trades Review.

FOREIGN MINING AND METALLURGY.

The successive crises through which European metallurgy has had to pass during the last three years have brought some strange results in their train. European ironmasters have had to sustain surprise after surprise. Thus, at a recent adjudication for 7000 tons of Vignoles Bessemer steel rails in Belgium the Rhine Steelworks Company (of Ruhrort) tendered at 10*l*. 7*s*. 6*d*. per ton, while the lowest price offered by a Belgian establishment—the John Cockerill Company, of Seraing—was 10*l*. 16*s*. per ton. The Bochum Company tendered at 11*l*. 3*s*. per ton, and the French house of Schneider, of Creusot, which vanquished the Germans among themselves at an adjudication which took place not long since, required 12*l*. 4*s*. per ton. The Germans have thus beaten the Belgians upon their own soil with a margin of 8*s*. per ton to spare. It would appear that Belgian ironmasters have thus a good deal to do to produce steel as economically as they now produce iron. The second consideration which suggests itself is that the importance of the question to Belgium is every day increasing. Twenty lots of iron rails which were tendered for upon the occasion to which we have been referring were shared between the Acoz forges and sundry other works; the tenders ranged between 8*l*. 17*s*. 6*d*. and 9*l*. 1*s*. 6*d*. per ton; at present rates these tenders presented no feature calling for special comment, except that they show a very small margin between the prices current for iron and steel rails. The age of steel would appear to have commenced.

Business in copper has been quiet at Paris, and prices have been sustained with some little difficulty. At Havre, Chilean bars have made 51*l*.; ditto, ordinary descriptions, 79*l*.; ditto in ingots, 80*l*. 10*s*.; English tough cake, 84*l*.; and pure Corocoro minerals, 86*l*. per ton. There has been no transaction to notice in copper upon the Havre market, and prices have been almost nominal. Lots of Urmetta have brought 79*l*. per ton. Copper has been well supported upon the Marseilles market. In Germany the demand for copper has been tolerably good, and several transactions have been effected, as well for consumption as for speculation. Tin has been somewhat depreciated in price at Paris. Banca, delivered at Havre for Paris, has made 103*l*.; Straits, ditto, 99*l*.; and English, delivered at Havre and Rouen, 98*l*. 8*s*. per ton. At Rotterdam tin has been quiet. The price paid for disposable Banca has been 57*l*. 10*s*. and there has been some demand at this rate. As regards deliveries for the September sale, business has been done at 56*l*. 10*s*. to 56*l*. 15*s*. Dis-posable Billiton has been held at 55*l*.; 500 ingots, to be delivered in October, have found purchasers at 54*l*. 10*s*. Tin maintains its price upon the German markets; there has, however, been very little doing in tin at Hamburg. Lead presents a relatively favourable state at Paris. French lead, delivered at Paris, has brought 21*l*. 8*s*.; Spanish, delivered at Havre, 21*l*.; English ditto, 21*l*. 4*s*.; and Belgian and German, delivered at Paris, 21*l*. 8*s*. per ton. The German lead markets have been somewhat irregular. There has been no variation in the price of zinc at Paris. At Marseilles rolled Vieille Montagne zinc has made 30*l*. per ton. Upon the German markets zinc has been somewhat hardened.

The French iron trade presents exactly the same appearance as last week. The slight revival which has been indicated for a month past has become more sensible, in consequence of a serious increase of small orders. Merchants are laying in supplies, warehouses are being filled, and adjudications are becoming more numerous, but there are few considerable affairs concluded, and if the present has acquired some security the future still remains cloudy. There is a tolerably good current demand for plates. An adjudication will take place on the 21st inst., at the Central Administration of Telegraphic Lines, at Paris, for 600 tons of galvanised iron wire. In presence of the tendency to a slight amelioration in business, which may still be said to prevail, prices are firmly maintained. Upon the Paris market merchants' iron is maintained at 9*l*. 12*s*. per ton, and plates at 12*l*. 16*s*. to 13*l*. 4*s*. per ton. Old rails are dealt in at 4*l*. to 5*l*. 4*s*. per ton. Some rather important contracts for iron rails have been concluded at rates ranging from 9*l*. 12*s*. to 10*l*. 12*s*. per ton. Iron tyres have been sold at 22*l*. per ton by the St. Etienne forges, while by a strange anomaly contracts have been concluded for Bessemer steel tyres at 20*l*. 16*s*. per ton. The imports of pig-iron and steel into France in the first seven months of this year present a diminution of 23,000 tons, or 19 per cent.; the exports also show a diminution of 3 per cent. At the close of June, however, this latter diminution was 9 per cent., so that a certain amount of ground was regained in July. The production of pig in France increased to the extent of 48,000 tons in the first half of this year, as compared with the corresponding period of 1873. On the other hand, the diminution in the production of iron of various kinds was 44,000 tons. The production of steel increased in the first half of this year to the extent of 28,000 tons; that of steel generally expanded to the extent of 23,000 tons. This increase is considerable for steel, since it represents progress to the extent of about 28 per cent. The production of steel in France is now established on a footing of about 215,000 tons per annum, with a probability of a further increase, as steel is being substituted more and more for iron. In presence of such manifest tendencies everyone seeks to improve or modify old methods. M. Masion, a director of works at Louvroil, has just patented a new system of puddling-furnaces, which is said to effect a large saving of coal.

Dullness being the order of the day in the coal trade in Belgium, depression in England, and a reduction in prices in the Ruhr group, the state of the French coal markets may be readily inferred. The dead season prevails for the moment, transactions are almost nil, and prices are barely maintained. Such is the present state of affairs as a whole. The differences in prices which are indicated, according to the various basins, are of little importance. The Pas-de-Calais begins to witness a revival in orders, and is bringing up its extractions to a level which enables it to reduce its cost price of production to some extent. Profits are thus improving without its being necessary to raise prices. In the basin of the Loire, on the other hand, the state of affairs is rather troubled. There is great quietness in the Belgian coal trade, and although the season is approaching when prudent people think of laying in their winter supplies, we cannot find in the aspects of this week the least symptoms of returning activity. Some colliery owners are credited with an intention to raise their tariffs as from Sept. 1. But current circumstances scarcely justify such tendencies. The period, indeed, has not yet arrived when the depression which weighs on business seems likely to terminate.

VALUABLE AND ECONOMIC LUBRICANT.—The subjoined communication will be of interest to all users of machinery, since the importance of having a really good lubricating oil can scarcely be overestimated:—

See a paragraph in last week's Journal respecting a new oil for lubricating. We think you have rather gone beyond the limits of what is strictly correct in saying this oil is considerably cheaper than any other oil that approaches its quality. We have, for seven years, been sole agents in this country for a real American natural lubricating oil, and we hold certificates from some of the leading houses in this country and the Continent, to the effect that it is as a lubricator equal to sperm oil, lard oil, or Galipoli oil, even for speeds of 3000 revolutions per minute, while there is a saving in price of nearly 40 per cent.; and, so far, nothing has been introduced that offers the same advantages of price and quality. We are prepared to appoint really efficient agents in all districts.

ALEX. SPARROW AND CO.

PORT PHILLIP.—The following is an extract from an Australian newspaper:—"The prospects of Clunes, though at present not conspicuously brilliant, are, nevertheless, most encouraging, and point unmistakably to the substantial and progressive advance of the town as a mining centre. The improvement which has taken place lately is none the less and lasting because it has been gradual and not immediately perceptible. I can refer to the good and regular returns characterising the continued good yields from the New North Clunes Mine, which have effectively falsified the doleful predictions made some time back respecting the value of the reefs possessed by that company. The extensive works of the Port Phillip and Clunes Company are pushed forward with a persistency and a determination which has tended both directly and indirectly to give Clunes the important position which it holds in the history of quartz mining in Victoria. A hope is entertained by the shareholders that the yields will be long before proportionate to the extensive favourable indications met with in the ground of this good old mine. Any point to the probability of a development in that direction, and the renewal of the Corandale, Louthair Freehold, and East Louthair claims shows that the shareholders are fully alive to the importance of the indications referred to."

The hitherto unavailing perseverance of the Clunes Consols Company, in the face of the prolonged disappointment, has doubtless proved very discouraging to the shareholders in that mine, but discoveries within the past few days lead to the hope that their enterprise and persistency will yet be duly awarded. It is impossible to believe that all the wealth of the auriferous reefs trending northwards is exhausted within the boundaries of the New North Clunes claim. Experienced miners are of opinion that the plateau north of Clunes will yet give up its stores of the precious metal in not inconsiderable quantities. Clunes has never been distinguished for heavy finds or new discoveries of auriferous lead tending to create a transient excitement, but the steady yields of some of the mines, and the succession of favourable indications by those which have not yet obtained any actual returns, go to prove that the patient plodding work which has been carried on for years past must infallibly meet with its ultimate reward."

AUSTRALIAN MINES.

PORT PHILLIP AND COLONIAL (Gold).—July 11: The quantity of quartz crushed for the four weeks ending June 17 was 5047 tons; pyrites treated, 25 tons; total gold obtained, 1,821 ozs. 13 dwts., or an average per ton of 3 dwts. 6 grs. Receipts, 3,296*l*. 10*s*. 8*d*.; payments, 3,466*l*. 1*s*. 6*d*.; loss, 170*l*. 7*s*. 10*d*.; which deducted from last month's credit balance of 299*l*. 1*s*. 5*d*. left an available balance of 128*l*. 13*s*. 7*d*. which was carried forward to next month's account.

SCOTTISH-AUSTRALIAN.—The directors have received advices from Sydney, dated July 9. The sales of coal from the Lambton Colliery for the month of June amounted to 4769 tons, making a total of 64,659 tons for the half-year ending June 30.

ANGLO-AUSTRALIAN.—Capt. Raisbeck, July 13: I have the honour to report progress since the 15th ult. Respecting the shaft, we have extended the north drive 54 ft.; distance from shaft, 185 ft. We have broken and crushed 140 tons of stone, yielding 39 ozs. 11 dwts., and have taken 7 ozs. 15 dwts. of gold from the plates. Total for the month, 47 ozs. 6 dwts. of retorted gold. I have 40 tons of stone at surface ready for crushing. No gold is to be seen when breaking, but there is a little improvement in the appearance of the stone. We have crushed for the public during the month 10 tons. I have had the boiler cleaned and the machinery thoroughly examined, which is now in excellent working order. I have also cut through the embankment of the south water dam, put in box drain and flood-gate, to tap dam when required. This is extra expense, but necessary work.

AUSTRALIAN CENTRAL (Gold).—Extract of letter from Mr. Gill, dated Fryerstown, July 13:—The results won from the mine, nearly 1800*l*. worth of gold in a little more than three months, obtained with less than half labour, and under all the disadvantages of opening up new ground, will be satisfactory evidence, I feel assured, as to the paying nature of the ground when worked to advantage, and it is well worth the serious consideration of the shareholders as to whether they will advance a few hundred pounds to provide a contingency fund, and afford me a safe footing. I would suggest that 1000 to 1500 shares be placed for that purpose, if possible. If such could be done, it should be done immediately, and a credit "wired" cut. The worst is now over, so far as unprofitable expenditure is concerned, the outlay now being confined to current expenses. The mine will be worked at a minimum cost, as compared with wages, and the prospects are really good; under such conditions it will be a great pity to sacrifice so well proved and valuable a property after having expended so much in bringing it into its present condition. Carrying on the works of an alluvial mine of this description is of necessity very costly, and without some available funds, in case of necessity, I fear it will be impossible to do more, particularly as I have no credit. I should not for one moment urge upon the shareholders the advisability of raising fresh funds were I not perfectly satisfied that as rich, or even richer, ground will be opened up north than has ever yet been struck, and pending that the present gutter will afford fair profits. Had the company been employing wages men instead of (at present) tributers since resumption of work the mine would now be closed, simply because I could not meet the cost of regaining the blocking faces lost during the late compulsory stoppage of the mine. This is an apt illustration of the danger the property is subject to without a contingency fund. The cost of opening up the mine has been more than covered by the gold won in doing so; the present liabilities represent the outlay for purchase and erection of the new engine, surface alterations, and payment of expenses incurred before my taking charge of the property. This outlay was totally unexpected, amounting to nearly 1200*l*. Capt. Angwin's report will show the condition of the mine at present. The rich ground he speaks of as being struck north promises well; it is too late a discovery yet to form any definite idea as to its real value, judging from the different nature of the wash to any other portion of the gutter already worked. I imagine we are on the point of discovering either a fresh tributary or a branch gutter. The ground is rather deeper than our present level, and to work it effectively a main reef drive will be necessary—in fact, it will be necessary to put a reef drive in for perhaps 500 or 1000 ft. if we strike anything really good. The mine is yet in its infancy.

Report from Captain Angwin, dated July 13.—Since my last report we have

erected a new winding engine, and now done all the necessary repairs preparatory to the tributers commencing operations. The tributers started to crush on June 21. The block of ground commenced on did not prove payable, which necessitated the opening out of new faces, and caused a delay, so we were not able to send up the quantity of wash dirt we anticipated. They have now commenced to work on good-looking wash dirt, which I think will pay well. I am glad to inform you we strike—in fact, the best looking wash dirt I have seen in the gutter; our present drive not being deep enough to work it we shall be compelled to extend a reef drive about 300 feet to enable us to properly work it. Of course, this cannot be done without a small outlay. I consider the prospects of the company are excellent. I may say this reef drive must be extended at once.

BREMER.—By last advices from Adelaide this mine appears to be improving steadily, but owing to a large accumulation of ore at grass awaiting crushing the raisings were not so large as in the previous month. More crushing machinery was being erected, and the colonial committee speak very confidently of the future.

YORKE PENINSULA.—By the June mail the directors informed the committee at Adelaide that preference shares were to be issued, and, guided by the advice of Mr. John Darlington, C.E., the company's consulting engineer, they instructed them in what manner operations at the Kurilla Mine should be resumed as soon as the committee should be advised by telegraph that the necessary capital had been raised by the issue of the preference shares. The first procedure directed being to take steps to raise the ore laid bare for 120 ft. in the 25 ft. level, west from Deeble's shaft, at the time operations were temporarily discontinued. In July the committee telegraphed to the directors, and reminded them that in order to preserve the company's rights to the Kurilla property intact a limited amount of work thereon, and therefore a small outlay were requisite, and upon this the directors telegraphed to the committee to do what was necessary to secure that object. On the 24th ult. the board received from the committee the telegram already published, and of the same date requested by telegraph that it might be verified, and more precise information supplied. The committee's letter of July, received on the 31st ult., explained what was doing and to be done in order to protect the company's rights, and made it evident to the directors where and by what means the fresh discovery of ore announced in the telegram received on 24th ult. was made. Not having received a reply to their telegram of the 24th ult., the directors on the 1st inst. telegraphed again; but before it could reach the committee the board have this day received the following confirmatory telegram:—"Kurilla discovery: confirmed prospects; extremely encouraging. Well-defined rich lode 100 fathoms East Hall's," which obviously means that the discovery has been made near the surface in working on the lode east of Hall's shaft, which, it may be observed is down to 45 fathoms, and driven from (eastwards) on the course of the lode at the 35 to the extent of 50 fathoms. This discovery has, in fact, been made in doing a limited extent of work required by the Government in such cases.

IMPROVED MOTIVE POWER.—The invention of Mr. ROBERT M. MARCHANT, C.E., of Kirby-street, Hutton Garden, consists in the special application and use of a combination of air, steam, and caloric as a motive power, such combination being applied to such purpose in continuous circuit of the already heated medium and in such manner that the caloric lost during the expansion of the heated air and steam in its application to effected power, either in any cylinder or other mechanical contrivance for effecting and transmitting the power, shall be restored to it again during its passage as air and steam through tubes in a heater or boiler so constructed as to facilitate its transit and the absorption by it of the heat which is communicated by the fire contained therein, after which operation it is continually re-used in the cylinder or other effector and transmitter of that power which is represented by the working pressure contained in such combination. The invention further comprises a special heater for the purpose of re-heating the highly compressed and saturated air and steam of the exhaust after its passage through the pump of the combined air, steam, and caloric engine, for each and every subsequent use in the cylinder or other application of attained pressures to the purpose of power. Also a special arrangement of valves to cylinders, by means of which the delivery and expansion of the high pressure combination of air, steam, and caloric is effected with one piston valve only, the effect being obtained at the time of most rapid travel of the valve.

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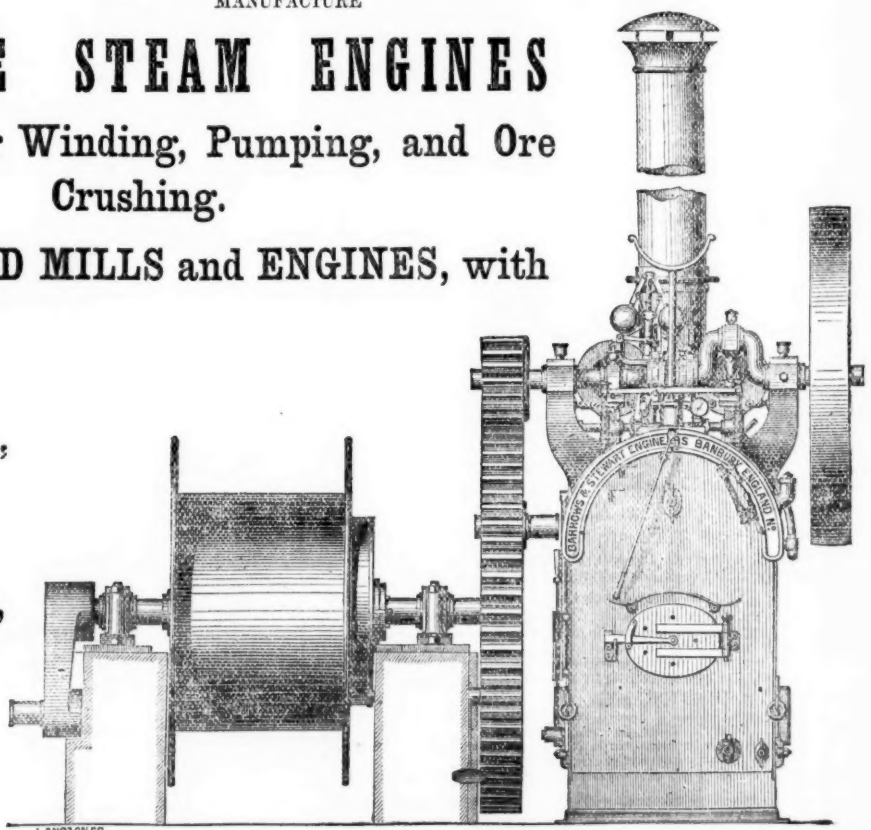
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This company grant licenses, under their patents, for the use, singly or in combination, of the most approved machinery for dressing ores, comprising Stamps, Jiggers, Classifiers, and Buddles.

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EXTRACTS FROM TESTIMONIALS RECEIVED:-

Mr. C. E. BAINBRIDGE, of the London Company's Mines, Middleton-in-Teesdale, by Darlington, writing on the 27th September, 1873, says—"After a full season's experience of the very complete Dressing Machine erected by you at our Colberry Mines, we are fully satisfied with our decision to adopt your patents in preference to all others. The machinery does its work as well as we can desire, and better than we anticipated. We are now getting through 70 tons of ore stuff per day, of rich quality. Without your machinery we should have been at a stand still, for we cannot get hands to supply our wants elsewhere. It saves fully one-half of the old wages, and vastly more on the wages we now give, and the saving in ore is not much short of 10 per cent. You can quote from this letter as you think proper."

Mr. COULTAS DODSWORTH, of Haydon Bridge, writes, on the 15th January, 1874:—"I have just returned from the Stonecroft and Greyside Mines, where I have seen your 'Patent Ore Dressing Machinery' at work, with which I must say, I was highly pleased. It is decidedly the best machinery I have ever seen for the purpose, the results being as near perfection as possible, and I am quite sure its use in this case will be a very great saving to the company. No large mining establishment should be without your machinery, especially when labour is difficult to procure—a mere fraction of the hands being only required as against the old system, and the work altogether much better done, and a great saving of ore effected. I have heard it said that your machinery is better adapted for poor than for rich ores, but from what I have seen to-day I am quite confident it will do for any kind of ore. I beg not only to congratulate, but also to compliment, you on the great success of your 'Patent Ore Dressing Machinery.' You may use this letter as you think proper."

Mr. MONTAGUE BRALE, Managing Director of the Cagliari Mining Company (Limited), says, on May 15th, 1873:—"I have much pleasure in speaking of the great efficiency of your 'Patent Dressing Machinery,' as erected by you at our mines at Rosas, in the Island of Sardinia. You will remember it has always been considered impossible to dress, or rather separate, the minerals our ores contain by machinery, but our captain assures me he gets a constant return of 76 per cent. of lead with the greatest ease, and I know by the returns we are realising the best market price. I consider this company is much indebted to you for the success you have achieved at so small cost. It may interest you to know, from my experience in several of the British possessions, including the whole of the Australian Colonies, that my opinion is I have never seen any dressing machinery that can efficiently, and at so small a cost, dress, and separate metallic ores, however close the mechanical mixture may be, as yours. You can use this letter in any way you like."

The most satisfactory testimonials also have been received from the GREENSIDH MINE COMPANY, Westmorland; the FAIRBACH MINING COMPANY, North Wales, and others. Copies of these may be had from Mr. GREEN.

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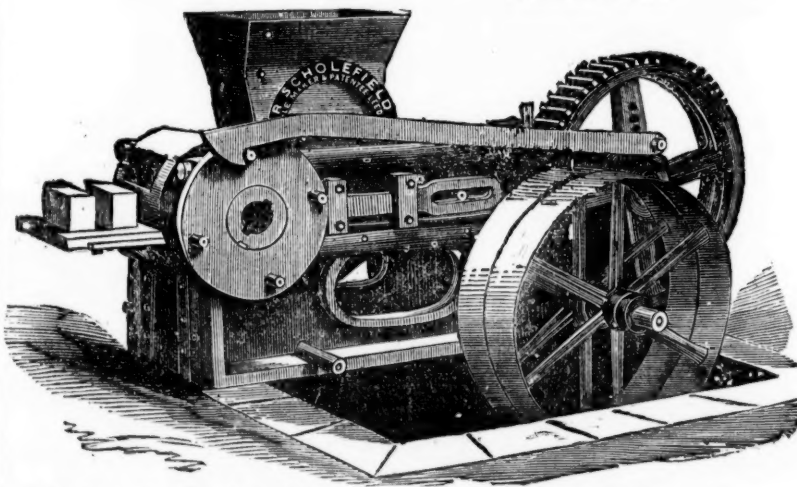
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2 men digging, each 4s. per day	£0 8 0
1 man grinding, 4s. 6d. per day	0 4 6
1 boy taking off bricks from machine, and placing them in barrow ready for the kiln, 2s. per day	0 2 0
1 boy greasing, 1s. 6d. per day	0 1 6
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Total cost of making 10,000 pressed bricks

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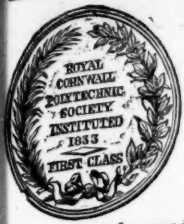
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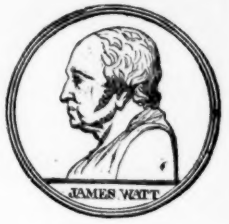
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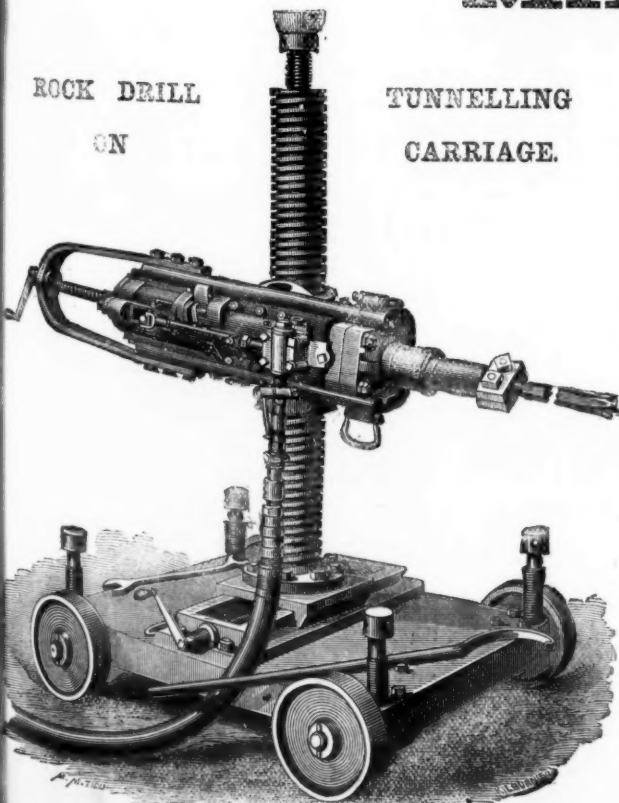


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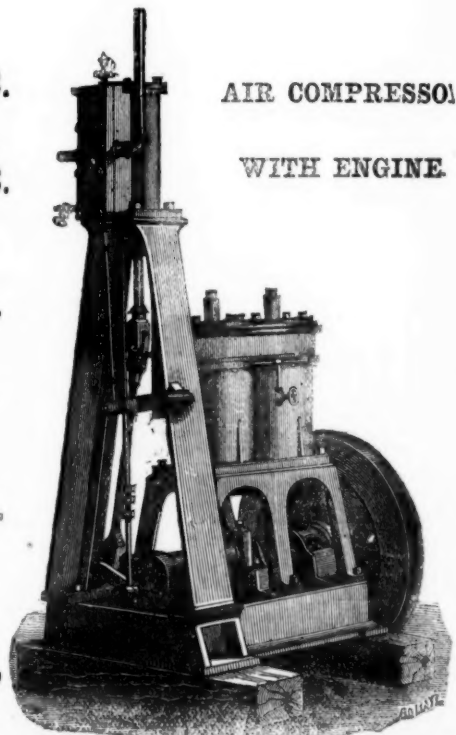
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Small Wear and Tear.
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Simplicity of Construction.
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ALSO,

ROAD METAL-MAKING MACHINES,

WITH

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FOR

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TO

ANY REQUIRED SIZE

EXCLUSIVELY ADOPTED BY HER
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Mining Improvements. Revolving Picking Table.

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AWARDED 45 GOLD AND SILVER MEDALS

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